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The effect of integrated thinking on CSR decoupling and the moderating role of managerial ability

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Abstract

This study investigates the relationship between integrated thinking and CSR decoupling, defined as the gap between firms' CSR performance and their CSR disclosure. Grounded in neo-institutional theory, systems thinking, and the resource-based view, the research explores whether integrated thinking can serve as a substantive mechanism to reduce CSR decoupling. Additionally, the moderating role of managerial ability is examined. The analysis is based on a sample of 10,526 firm-year observations from 2,278 firms across 61 countries over the period 2013–2022. Using a multilevel mixed-effects regression model, the results indicate a significant negative association between integrated thinking and CSR decoupling, suggesting that firms with a higher level of integrated thinking are more likely to align their CSR disclosure with actual CSR performance. However, no significant moderating effect of managerial ability was found. These findings contribute to the literature by providing empirical evidence for the potential of integrated thinking to mitigate symbolic CSR practices and promote more authentic corporate sustainability communication.

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1 Introduction

Corporate sustainability responsibility (CSR) has become a central concern in the field of corporate governance. However, many firms encounter difficulties with CSR decoupling (Luan, 2024; Velte, 2023). This term refers to the misalignment between a company's public commitments to CSR and its actual CSR performance (He et al., 2023; Wang et al., 2025). This misalignment, often described as the difference between 'CSR talk' and 'CSR walk' (Hawn & Ioannou, 2016; Tashman et al., 2019; Luan, 2024), is not inherently detrimental but can lead to potential organizational and financial risks (Barth et al., 2017; Gong et al., 2021). These practices often result in information asymmetry and conflicts of interest between companies and external stakeholders (Velte, 2023). Specifically, CSR decoupling may lead to a perception of hypocrisy, resulting in a decline in corporate reputation and a decrease in consumer trust (He & Gan, 2025). Furthermore, the misalignment between internal and external CSR actions has been demonstrated to exert a detrimental effect on firm value (Bothello et al., 2023).

Against this backdrop, scholars and practitioners are increasingly advocating for integrated thinking for understanding CSR decoupling, which contrasts with other commonly studied organizational and governance-related factors. Prior studies have investigated drivers such as external sustainability assurance (Perego & Kolk, 2012), regulatory environments (Tashman et al., 2019), and institutional ownership (Malik et al., 2020), which tend to reflect external governance structures and oversight mechanisms. In contrast, integrated thinking is grounded by systems thinking principles and emphasizes a strategic, internally driven mindset in which a firm embeds financial and non-financial considerations into its business activities (IIRC, 2021; Oliver et al., 2016; Dimes & de Villiers, 2024). Systems thinking views an organization as not just a collection of isolated parts, but as a complex system in which all components are interdependent and interact. It encourages understanding the big picture by recognizing relationships, feedback loops and emergent properties within the organization (Checkland, 1985). Rooted in systems thinking theory, integrated thinking conceptualizes the firms as a dynamic, interconnected system of capital flows (Checkland, 1985; Dimes & de Villiers, 2024).

While the concept of integrated thinking has gained attention in governance disclosure, there remains a lack of empirical research explicitly examining the direct relationship between

integrated thinking and CSR decoupling. Prior studies have largely examined the role of integrated thinking in improving reporting quality (Barth et al., 2017), assurance practices (Baboukardos et al., 2021) or firm value (Zhao et al., 2025). However, few have noted whether integrated thinking affects the actual alignment between CSR disclosure and performance. As Reimsbach & Braam (2023) argues, integrated thinking enhances the alignment between CSR intentions and corporate behavior, suggesting that integrated thinking may serve not merely as a reporting feature but as a managerial ability (Reimsbach & Braam, 2023).

In addition to integrated thinking, another key factor is potentially missing in studying the relationship of integrated thinking and CSR decoupling is managerial ability. Managerial ability, within the framework of the resource-based view (RBV), refers to the ability of a firm's top management to allocate resources efficiently and improve firm performance (Demerjian et al., 2012). A common concern is that given the significant influence that corporate executives have on a company's strategic decisions, they may also have a significant impact on a company's CSR decisions (Yuan et al., 2019). The resource-based view argues that an organization's competitive advantage derives from its unique and valuable internal resources and capabilities (Barney, 2001). Managerial capabilities, which include the competence, vision and strategic acumen of organizational leaders, fit well within this framework (Holcomb et al., 2009). However, whether managerial ability is indeed a critical enabler of integrated thinking remains an open question. Therefore, it is important to examine the potential impact of managerial ability on the relationship between integrated thinking and CSR decoupling in organizations.

Thus, a fundamental question arises regarding the extent to which integrated thinking, as an organizational mindset, is associated with CSR decoupling practices. Specifically, this study aims to investigate whether companies demonstrating higher levels of integrated thinking engage in less CSR decoupling? In addition, it explores whether managerial ability moderates the relationship between integrated thinking and CSR decoupling. By investigating this question, the current study makes several contributions: First, it responds to an urgent practical concern, which is understanding how to turn integrated thinking into genuine CSR performance, it is crucial in a world of skeptical stakeholder and stringent sustainability regulations. Second, it fills the gap in the academic literature. Prior work has documented that integrated thinking

promotes value creation identifying a new contingency. Finally, this research design, focusing on the intersection of integrated thinking, CSR disclosure and practices, and managerial ability, yields novel insights that would not emerge from simpler models. In sum, this inquiry addresses the complex organizational mechanisms that may either reinforce or mitigate inconsistencies between firms stated CSR commitments and their actual performance.

This paper is organized as follows. Section 2 reviews the existing literature and hypothesis development. Section 3 describes data, measures, and variables. Section 4 presents the empirical results, and Section 5 concludes the paper.

2 Literature review and Hypothesis Development

2.1 Neo-institutional perspective on CSR decoupling

CSR decoupling refers to the misalignment between a company's externally communicated CSR commitments and its internally implemented CSR practices (Hawn & Ioannou, 2016). Hawn & Ioannou (2016) define this misalignment as a gap between external CSR communication and substantive internal CSR actions, highlighting that such decoupling can manifest both as overstatement (symbolic CSR disclosure without action) or understatement (genuine internal CSR action without full disclosure) (Hawn & Ioannou, 2016). Expanding on this concept, Graafland & Smid (2019) propose a two-dimensional typology of CSR decoupling: The phenomenon of "policy-practice decoupling", occurs when organizations formally commit to CSR policies yet fail to translate these commitments into meaningful actions. "Means-ends decoupling", on the other hand, arises when CSR initiatives are implemented, but firms fail to achieve the intended social or environmental outcomes due to ineffective execution or contextual barriers (Graafland & Smid, 2019).

Extensive research highlights that CSR decoupling negatively impacts consumer trust, increasing perceived risks and consequently diminishing consumer satisfaction and loyalty (Hawn & Ioannou, 2016b; García-Sánchez et al., 2021). Hawn & Ioannou (2016) provides foundational insights that demonstrate that the higher the degree of CSR decoupling, the lower the market

value of the firm, mainly due to increased information asymmetry. Similarly, García-Sánchez et al. (2021) found that CSR decoupling undermines market efficiency and prompts investors to adopt protection mechanisms, thereby raising the cost of capital for firms and limiting their access to finance. In addition, increased CSR decoupling is associated with increased analysts' forecast errors, highlighting reduced transparency (García-Sánchez et al., 2021). Building on these findings, He et al. (2023) confirmed a negative relationship between CSR decoupling and corporate financial performance, emphasizing that such decoupling erodes crucial intangible assets like corporate reputation and market trust, highlighting the urgency of fostering genuine CSR alignment within organizations.

Neo-institutional theory provides a robust framework for understanding why firms engage in CSR decoupling. According to neo-institutional theory, firms typically conform to external norms and expectations, not only to be operational efficient, but also to gain and maintain legitimacy in the environment in which they operate (Rowan & Meyer, 1977; Kostova & Zaheer, 1999). Legitimacy, in this context, refers to perception that an organization's actions are appropriate within a socially constructed system of norms and beliefs (Petrenko et al., 2016). As CSR becomes increasingly institutionalized, firms face mounting pressures from governments, NGOs, and the public to exhibit responsible behavior (Hahn & Lülfes, 2014; Wang et al., 2025). However, a central tenet of the new institutional theory highlights the potential for conflict: these external institutional requirements may conflict with an organization's internal goals (Kostova & Zaheer, 1999), such as efficiency or profitability. This inherent tension often leads to decoupling, where firms symbolically respond to external pressures to appear compliant, while substantively addressing internal goals. This practice, commonly known as “greenwashing”, involves overstating or misrepresenting CSR efforts to superficially meet stakeholder expectations (Delmas & Burbano, 2011; Tashman et al., 2019).

Neo-institutional theory frames CSR decoupling not as a failure of intent, but as a rational strategic choice by companies to navigate conflicting institutional demands (Greenwood et al., 2011). According to Greenwood et al. (2011), by adopting a “façade of acquiescence”, firms can maintain legitimacy and mitigate external scrutiny while minimize costly reforms. This understanding is crucial for interpreting CSR behavior. Consequently, addressing CSR decoupling

requires not only greater transparency but also organizational mechanisms that align internal practices with external commitments in a meaningful and credible way.

2.2 Integrated thinking and CSR decoupling

Integrated thinking is defined by International Integrated Reporting Council (IIRC, 2013) 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". It is a strategic management orientation that embeds sustainability into decision-making processes (Adams & Simnett, 2011; IIRC, 2013; Oliver et al., 2016). Integrated thinking is conceptually distinct from integrated reporting, which serves as the external communication tool. The dynamic between them is that integrated thinking leads to integrated reporting. When a company successfully embeds integrated thinking within its business model, the resulting integrated reporting can then act as a catalyst for broader organizational change (Feng et al., 2017; IIRC, 2021)

Despite that integrated thinking is not a new concept in accounting field, scholars have long criticized it for lacking a robust theoretical foundation (Oliver et al., 2016). Recent scholarship proposes systems thinking as a promising theoretical foundation of integrated thinking (Baboukardos et al., 2021; Reimsbach & Braam, 2023). Systems thinking is an approach used to analyze complex issues by examining how different components, such as people, processes, resources, and environmental factors, interact with larger organizational or ecological contexts (Checkland, 1985). This approach identifies how these various parts influence each other, aiming to achieve a comprehensive understanding of the whole system rather than isolated parts (Reynolds & Holwell, 2010; Williams et al., 2017). It emphasizes a holistic understanding, looking at how different elements within an organization, stakeholders, and forms of capital influence and depend on each other dynamically (Gray, 1992; Morel & Ramanujam, 1999).

System thinking directly supports integrated thinking by providing the framework to manage multiple capitals, such as financial, social, and ecological, for resilient organizational outcomes (Adams, 2017). It offers conceptual lens and practical methods that allow managers to visualize and analyze complex interdependencies within their organization. This aligns deeply with

integrated thinking's objective to embed long-term value creation (IIRC, 2021; Reimsbach & Braam, 2023). In essence, systems thinking serves as the underlying framework that allows integrated thinking to effectively address complex organizational and social challenges (Dimes & de Villiers, 2024).

Several studies have found that integrated thinking has a positive impact on firm value (Baboukardos et al., 2021; Reimsbach & Braam, 2023; Zhao et al., 2025). For instance, Baboukardos et al. (2021) explore integrated thinking from the perspective of sustainability report assurance by using a broad international sample. Their research confirms that firms with higher level of integrated thinking are more likely to engage in audited sustainability reporting, thereby increasing transparency and stakeholder trust. Furthermore, consistent with neo-institutional theory, the impact of integrated thinking is moderated by the type of level system, with a greater impact in common law environment, which is shareholder oriented.

Reimsbach & Braam (2023) later examined the relationship between integrated thinking and firms' social and environmental value creation. Their empirical study concluded that the positive correlation between firms' CSR performance and integrated thinking is stronger in firms that trade off short-term financial performance. It is important to note that their study did not find that this positive impact would require long-term financial performance at the cost of (Reimsbach & Braam, 2023). More recently, Zhao et al. (2025) investigate the effects of integrated thinking on firm value by using textual analysis. The finding of this study indicates that integrated thinking is positively associated with financial and non-financial value creation.

These studies are particularly relevant to this study as they demonstrate that integrated thinking affects both financial and non-financial dimensions of firm value, supporting the aim of IIRC to improve information to stakeholders as well as to improve internal decision making by promoting integrated thinking (IIRC, 2013; Reimsbach & Braam, 2023). The evidence provided by Reimsbach & Braam (2023) underscores the importance of integrated thinking in harmonizing sustainability with long-term financial objectives, despite the potential short-term financial drawbacks.

The effects of integrated thinking on CSR decoupling is a critical area of inquiry, not merely a straightforward confirmation of a positive outcome. Most prior studies on integrated thinking

have focused on its association with value creation (Adams, 2017; Reimsbach & Braam, 2023), capital market outcomes (Zhao et al., 2025), or reporting quality (Baboukardos et al., 2021), leaving a notable empirical gap regarding its direct role in bridging the CSR disclosure-performance gap. This research aims to fill this omission by empirically investigating the degree to which integrated thinking affects CSR decoupling.

The theoretical mechanism proposed posits that integrated thinking, through its promotion of a holistic, systems thinking approach to value creation, directly addresses the antecedents of CSR decoupling (Adams, 2017). By pressing companies to truly integrate various sustainability issues across multiple capitals (financial, manufactured, intellectual, human, social/relational and natural) and breaking down silos within organizations, integrated thinking fosters substantive rather than symbolic corporate actions (Oliver et al., 2016; IIRC, 2021). This systemic integration promotes true value creation, essentially aligning organizational practices with the CSR (Brown & Dillard, 2014). As a result, companies gain substantial legitimacy through these embedded practices, and thus reduce symbolic CSR activities (Michelon et al., 2015). Consequently, systems thinking actively counters the conflicts between institutional pressures and internal operational goals that typically lead to CSR decoupling, as delineated by neo-institutional theory (Hahn & Lülfes, 2014). By fostering a holistic mindset and promoting value creation across multiple capitals, integrated thinking encourages firms to embed CSR considerations into both their internal decision-making processes and external communications. This systemic integration reduces the reliance on symbolic CSR gestures and, consequently, diminishes the impetus for firms to engage in CSR decoupling practices (Baboukardos et al., 2021; Bothello et al., 2023; Reimsbach & Braam, 2023).

Based on the discussion above, these findings collectively suggest that higher levels of integrated thinking will likely reduce CSR decoupling by enhancing strategic alignment between sustainability disclosures and actual practices. Hence, the main hypothesis of this paper is as follows:

H1: Firms that demonstrate higher level of integrated thinking will exhibit lower CSR decoupling.

2.3 Managerial Ability as a Moderator

A potentially significant, yet not extensively explored, factor in understanding the dynamics between integrated thinking and the CSR decoupling is managerial ability. While previous studies on CSR decoupling have identified managerial ability as a determinant (Yuan et al., 2019; Chen et al., 2020; Gong et al., 2021), this study uniquely emphasizes managerial ability as a potential internal moderator. Managerial ability is defined as the effectiveness and skill of a company's top executives in achieving the desired organizational goals such as profitability, operational efficiency (Demerjian et al., 2012). This internal focus is crucial because, while integrated thinking provides a strategic framework for aligning internal decision-making with long-term value creation (IIRC, 2021; Reimsbach & Braam, 2023; Dimes & de Villiers, 2024), the extent to which it translates into consistent CSR actions may depend on managerial ability, which is a potential moderating factor that has not yet been empirically examined in this context.

From the perspective of the resource-based view (RBV), managerial ability is considered a key intangible asset that shapes a firm's ability to allocate resources efficiently (Barney, 2001), and effectively create value (Holcomb et al., 2009). According to Holcomb et al. (2009), high-ability managers possess excellent strategic vision and are adept at navigating complex organizational environments. This enables them not only to optimize resources through superior operational efficiency and strategic positioning to improve financial results, but also to effectively manage non-financial aspects. (Holcomb et al., 2009). For example, Gong et al. (2021) demonstrate in the energy industry, managerial ability strengthens the link between CSR and firms performance by improving resource allocation process.

Moreover, managerial ability is likely to shape how firms perceive, interpret, and respond to institutional pressures related to CSR expectations. According to neo-institutional theory, firms are often facing conflict demands of internal operational goals and institutional demands to secure legitimacy (Rowan & Meyer, 1977; Hahn & Lülfs, 2014). This pressure to appear legitimate may result in CSR decoupling (Tashman et al., 2019). However, prior research suggests that managerial ability may moderate firm's strategic responses to such institutional demands. Yuan et al. (2019) find that CEOs with higher managerial ability are more likely to pursue genuine, long-term CSR strategies and avoid symbolic CSR practices. High-ability managers possess not

only technical competence but also the cognitive ability to integrate complex and sometimes conflicting expectations into the firms' broader strategic objectives (Yuan et al., 2019).

Linking on the findings from Holcomb et al. (2009), Yuan et al. (2019), and Gong et al. (2021), this study proposes that managerial ability enables firms to more effectively translate integrated thinking into consistent CSR actions. While integrated thinking provides a holistic framework for aligning internal processes with multiple capitals, its effectiveness often requires managerial ability to efficiently leverage their ability as organizational resources and navigate complex organizational systems. Thus, from a resource-based view perspective, managerial ability serves as the crucial organizational resources that transforms integrated thinking into substantive CSR practice. Accordingly, we propose the following hypothesis:

H2: The negative effect of integrated thinking on CSR decoupling will be stronger in firms with higher managerial ability.

3 Research Method

3.1 Sample and data collection

To empirically test the proposed hypotheses, this study employs a quantitative analytical approach using a large international panel dataset. The sample comprises listed companies from 61 countries for the period 2013 to 2022. This specific timeframe is chosen because 2013 marks the establishment of the International Integrated Reporting Framework by the IIRC, which formalized and promoted the concept of integrated thinking globally (IIRC, 2013). The ten-year period allows for a robust analysis of trends and relationships over time. By including firms from 61 countries, the sample captures significant variation in regulatory, legal, and cultural contexts (Talpur et al., 2023). This diversity provides more rigorous setting to test the hypotheses, as it allows the model to account for how different institutional pressures might affects CSR decoupling and enhances the generalizability of the findings.

Consistent with prior studies (Baboukardos et al., 2021; Reimsbach & Braam, 2023), I measure integrated thinking using the Corporate Governance CSR Strategy Score from Refinitiv

ASSET 4 ESG database. This proxy captures the degree to which a firm embeds CSR factors into strategic decision-making and governance, reflecting the holistic, long-term perspective emphasized in integrated thinking. Managerial ability is measured following Demerjian et al. (2012), employing a two-stage DEA model to isolate the efficiency to managerial ability. CSR decoupling is operationalized as the absolute difference between internal and external CSR indicators, aligning with the approach used in Hawn & Ioannou (2016) and Bothello et al. (2023).

The initial sample was reduced due to missing data, particularly for the managerial ability variable, which required specific financial disclosures that are not consistently available across all firms, especially in the earlier years of the sample period. After merging the data and moving observations with missing values for the key variables, the final sample consists of 10,526 firm-year observations from 2,278 unique firms, as detailed in Table 1.

Table 1: Sample Overview Across 2013-2022

Year	Total firms	Minus missing IT	Minus missing CSR	Minus missing MA	Final Usable Firms
2013	13,049	8,966	8,979	11,343	844
2014	13,049	8,878	8,900	11,177	896
2015	13,049	8,054	8,075	11,034	1,013
2016	13,049	7,254	7,273	10,927	1,074
2017	13,049	6,224	6,304	10,840	1,246
2018	13,049	5,557	5,547	10,715	1,479
2019	13,049	4,524	4,510	10,619	1,744
2020	13,049	3,387	3,352	10,571	2,095
2021	13,049	2,810	2,799	10,519	2,278
2022	13,049	7,074	7,272	10,512	1,303

Note: This table shows the process of screening the initial sample of firms across years to arrive at the final usable sample, based on available data on integrated thinking, CSR and management capabilities.

Table 2: *Overview Firms per Country in Sample* shows the number of firms from each country included in the final dataset after removing all missing values for key variables such as CSR decoupling, integrated thinking, and managerial ability. The final sample consists of 2,278 unique firms from a wide range of countries. The countries with the largest number of firms are China (456), the United Kingdom (352), the United States (288), Germany (222), and Australia (158).

Other countries with significant representation include India, Hong Kong, Japan, and South Korea.

Table 2: Overview Firms per Country in Sample

Country	Number of Firms	Country	Number of Firms
United Arab Emirates	6	Kenya	1
Argentina	9	South Korea	99
Austria	24	Kuwait	5
Australia	158	Cayman Islands	2
Belgium	17	Kazakhstan	1
Brazil	73	Luxembourg	6
Canada	80	Morocco	5
Switzerland	76	Mexico	20
Chile	2	Malaysia	72
China	456	Nigeria	1
Colombia	5	Netherlands	37
Czech Republic	3	Norway	45
Germany	222	New Zealand	23
Denmark	34	Oman	1
Egypt	4	Peru	4
Spain	8	Philippines	14
Finland	46	Poland	13
France	67	Portugal	2
United Kingdom	352	Qatar	5
Greece	6	Romania	3
Hong Kong	126	Russia	17
Hungary	2	Saudi Arabia	10
Indonesia	13	Sweden	152
Ireland	10	Singapore	30
Isreal	8	Slovenia	2
India	133	Thailand	27
Iceland	3	Turkey	4
Italy	52	Taiwan	80
Jersey	1	United States	288
Japan	101	Vietnam	8
South Africa	56		

Note: This table shows the distribution of the 2,278 unique firms by country in the final sample.

3.2 The independent variables

To measure integrated thinking, I use the Corporate Governance CSR Strategy Score from the Refinitiv ASSET4 ESG database. This selection of this proxy was made after careful consideration of both conceptual alignment and data availability. This metric is chosen because

it aligns with the IIRC's (2013) definition of integrated thinking, which involves embedding financial and non-financial considerations into corporate strategy and governance structures. The score is normalized on a 0 to 100 scale, captures the extent to which a firm has integrated with higher values indicating a greater degree of integrated thinking.

Managerial ability is measured using the two-step Data Envelopment Analysis (DEA) model developed by Demerjian et al. (2012). This method is designed to isolate the contribution of managers to firm performance by measuring how effectively they generate revenue from a given set of resources compared to their peers (Demerjian et al., 2013). This measurement aligns with the theoretical role of managerial ability in value creation, especially under complex or constrained conditions, as suggested by Holcomb et al. (2009).

Demerjian et al. (2012) proxy of managerial ability is calculated using two-step process. In the first step, a firm's overall operation efficiency is calculated using DEA. This technique benchmarks each firm against an "efficiency frontier" composed of the most efficient firms in the same industry (Demerjian et al., 2013). A firm's efficiency score is determined based on its ability to maximize output (Sales) for a given set of inputs, as shown in equation (1). The input variables used in the DEA model include cost of goods sold (COGS), selling, general, and administrative expenses (SG&A), net property, plant, and equipment (PPE), goodwill, all of which are scaled by total assets to ensure comparability across firms of different sizes.

$$Efficiency_{it} = \frac{Sales_t}{\delta_1 COGS_t + \delta_2 SG\&A_t + \delta_3 PPE_t + \delta_4 Goodwill_t} \quad (1)$$

Where, $Efficiency_{it}$ is the efficiency score for which the values range from 0 to 1. As an output, we consider non-zero sales of the firms. Further details on the descriptions of variables used in calculation of managerial ability score (MA) can be found in Appendix D.

In the second step, this efficiency score is regressed on firm-specific characteristics that are not directly attributable to the manager, such as firm size, age, market share, segment concentration, and the presence of foreign operations (Demerjian et al., 2013), as shown in equation (2):

$$FirmEfficiency_i = \alpha + \beta_1 Size_{it} + \beta_2 MKTSH_{it} + \beta_3 FCF_{it} + \beta_4 Age_{it} + \beta_5 BusSeg_{it} + \beta_6 Fcurr_{it} + \varepsilon_i \quad (2)$$

Where the unexplained part, ε_i , of the firm efficiency is considered as managerial ability. In the next step, a variable MA_{it} is used in the statistical interaction regression model. I expect the negative relationship between integrated thinking and CSR decoupling to be stronger in firms with higher MA_{it} .

3.3 The dependent variable

The dependent variable, CSR decoupling, represents as the gap between firms' CSR disclosures and actual CSR performance. To operationalize CSR decoupling, this study follows a modified version of the approach used by Hawn & Ioannou (2016) and more recently Bothello et al. (2023). They define CSR decoupling as the difference between a firm's internal actions and its external actions. Due to the evolving availability of ESG indicators, I adopt a modified yet aligned version of their methodology using data from the Refinitiv ESG database. This approach reflects the institutional theory perspective that organizations may symbolically respond to stakeholder pressures via high disclosure, even when actual CSR practices are weak (Delmas & Burbano, 2011; Hawn & Ioannou, 2016b). A comprehensive list of the factors included in each indicator is available in Appendix A. The CSR decoupling score is computed as the absolute value of the difference between a firm's internal and external actions regarding to CSR as follow:

$$CSR\ Decoupling = Internal\ CSR - External\ CSR \quad (3)$$

To calculate the discrepancy between internal and external actions, each factor will be assigned either 1 or 0 points. In the case of yes or no aspects. 1 point is awarded if the firm scores a yes on that aspect.

A higher CSR decoupling score indicates greater misalignment between what a firm substantively acts and what it discloses, which is overstatement decoupling (Hawn & Ioannou, 2016b). This indicator allows for a replicable, quantitative assessment of decoupling across a large international firm sample.

3.4 Control variables

To prevent omitted variable bias and isolate the effect of the independent variables, several firm-level control variables are included in the model. Consistent with prior literature (García-

Sánchez et al., 2021; Reimsbach & Braam, 2023). This study included firm size, leverage, analyst coverage, and firm age as control variables. Firm size (SIZE) is measured as the natural logarithm of total assets. Larger firms tend to have more attention for stakeholders and possess greater resources, which is commonly used control in CSR research (Baboukardos et al., 2021; Bothello et al., 2023; Reimsbach & Braam, 2023). Leverage (LEV) is calculated as the ratio of long-term debt to total assets and reflects the financial flexibility of a firm. Following Dhaliwal et al. (2012), this study uses a consistent definition of leverage to maintain comparability. Analyst coverage (ANCOV), measured as the natural logarithm of one plus the number of financial analysts covering the firm in a given year, proxies to control for capital market pressure and transparency incentives (Reimsbach & Braam, 2023). Firm age (AGE) is measured as the natural logarithm of the number of years since the firm's incorporation. Older firms are more likely to have established routines and long-standing practices, which may include a more consistent and structured approach to CSR (Kim et al., 2012; Reimsbach & Braam, 2023).

3.5 Statistical model

To test the hypotheses, this study employs a multilevel mixed-effects regression model. This model is appropriate for the panel data structure, which involves observations over time for firm nested within different countries. It allows for the analysis of relationships while accounting for unobserved heterogeneity at both the firm and country levels (Barth et al., 2017; Baboukardos et al., 2021; Reimsbach & Braam, 2023). The following equation (4) is the model used to test the research hypotheses:

$$\begin{aligned}
 CSR\ Decoupling = & \beta_0 + \beta_1 IT_{it-1} + \beta_2 MA_{it-1} + \beta_3 (IT_{it-1} * MA_{it-1}) + \\
 & \beta_4 FIRM_{CONTROL,it} + \beta_5 INDUSTRY_{CONTROL,it} + \beta_6 COUNTRY_{CONTROL,it} + \\
 & \beta_7 YEAR_{CONTROL,it} + \epsilon
 \end{aligned} \tag{4}$$

To mitigate concerns about reverse causality and better establish a causal direction, the independent variables, integrated thinking IT_{it-1} and managerial ability MA_{it-1} , are lagged by one year. This ensures that the measures of integrated thinking and managerial ability from the previous year (t-1) are used to predict CSR decoupling in the current year (t). This approach is consistent with the theoretical assumption that both integrated thinking and managerial ability

represent forward-looking strategic capabilities that shape firms' decision-making processes, and that their effects on outcomes like CSR decoupling may not be immediate but rather unfold over a longer period (Gong et al., 2021; Reimsbach & Braam, 2023).

To address the effects of integrated thinking on CSR decoupling may differ depending on managerial ability, this study also includes the interactions effects between the lagged effects of integrated thinking and managerial ability ($IT_{it-1} * MA_{it-1}$). The model includes a vector of firm-level control variables, including firm size, leverage, analyst coverage, and firm age. Table 3 provides an overview of the variables used in the analysis.

Moreover, following previous study by Reimsbach & Braam (2023), the model includes fixed effects for both industry ($INDUSTRY_{CONTROL,it}$) and year ($YEAR_{CONTROL,it}$). Industry fixed effects account for time-invariant, unobserved differences across industries. By including industry fixed effects, the model effectively controls for industry-specific heterogeneity, ensuring that the estimated coefficients are not biased by unique factors of specific industry regulatory pressures or norms regarding CSR. In addition, year fixed effects control for macroeconomic trends or global shocks that affect all firms in a given year, prevents the model from incorrectly attributing broad, time-based trends to the independent variables.

Random effects are used in the model to generalize findings beyond specific firms and countries in the sample (Baboukardos et al., 2021; Reimsbach & Braam, 2023). The 2,278 unique firms in the dataset are treated as a random sample from a larger population of global firms, accounting for the fact that multiple observations from the same firm are not independent. This part of model estimates how much of the total variation in CSR decoupling is due to stable, unobserved characteristics unique to each firm. Similarly, including 61 countries as random effects accounts for unobserved heterogeneity at the national level, such as differences in institutional environments and cultural norms, which is crucial for an international study (Baboukardos et al., 2021).

Table 3: Variable Definitions

Variable	Definition	Data Source	Notes
CSR Decoupling	Gap between CSR disclosure and CSR performance. Calculated as: Internal CSR actions - External CSR actions	Refinitiv Asset4 ESG	Higher values indicate symbolic CSR adoption.
Integrated Thinking (IT)	Composite index capturing the extent of ESG integration into governance and strategy. Constructed using governance-related indicators	Refinitiv Asset4 ESG	Higher score indicates a higher level of integrated thinking.
Managerial Ability (MA)S	Residual from a two-stage DEA model. Stage 1: estimate firm efficiency; Stage 2: regress efficiency on firm characteristics and use the residual as a proxy for managerial ability.	Datastream, Computed	Based on Demerjian et al. (2013)
Firm Size (SIZE)	Natural log of total assets.	Datastream, Computed	Controls for economies of scale.
Leverage (LEV)	Total debt divided by total assets.	Datastream	Measures financial risk.
Analyst Coverage (ANCOV)	Number of analysis covering a firm	Datastream	Proxy for external monitoring.
Firm Age (AGE)	Natural log of (current year – year of incorporation).	Datastream	Controls for organizational maturity.

Note: This table provides definitions, data sources, and relevant construction notes for all variables used in the empirical analysis.

4 Results and Discussion

4.1 Descriptive statistics

In Table 4 the descriptive statistics of the variables for the final sample are portrayed. The sample includes 13,420 firm-year observations. The average CSR Decoupling score is -0.03, which suggests that on average the firms in the sample undertake more external CSR practices than internal. This aligns with the notion of symbolic CSR disclosure, where firms emphasize appearances over substantive actions (Delmas & Burbano, 2011). However, as noted by Hawn & Ioannou (2016) there can also be positive decoupling scores, where internal CSR actions

outweigh external disclosures, which may reflect institutional constraints preventing open CSR communication (Hawn & Ioannou, 2016).

Regarding the average score for integrated thinking 46.61, meaning that firms vary a lot in how well they include environmental, social, and governance factors in their decision making. Managerial Ability, calculated using the Data Envelopment Analysis (DEA) method, has an average score of 0.27. This suggests that most managers demonstrate moderate levels of efficiency, with a smaller number showing strong performance. For the control variables it can be seen that on average around 12 analysts cover the firms in the sample. Firm Age ranges widely, from new companies to those over 274 years old, with an average of 44 years.

Table 4: Descriptive Statistics

Variable	Observations	Mean	Median	Std. Dev.	Min	Max
CSR Decoupling	13420	-0.03	0	0.19	-0.78	0.67
Integrated Thinking	13420	46.61	47.68	31.56	0	99.84
Managerial Ability	13420	0.27	0.25	0.14	0	1.21
Firm Size	13420	16.6	16.25	2.84	9.61	27.08
Leverage	13420	0.27	0.25	0.18	0	3.83
Analyst Coverage	13420	11.65	10	8.89	0	54
Firm Age	13420	44.45	31	35.33	0	274

Note: This table provides descriptive statistics for all variables used in the analysis.

Table 5 displays the correlation matrix for the main variables used in the analysis. CSR Decoupling is negatively and significantly correlated with all other variables, particularly with integrated thinking (IT), managerial ability (MA), firm size (SIZE), leverage (LEV), analyst coverage (ANCOV), and firm age (AGE). This negative correlation indicates that firms with higher level of integrated thinking and managerial ability are slightly less likely to exhibit CSR decoupling.

Furthermore, the correlation matrix also helps assess the potential for multicollinearity between explanatory variables. A commonly used guideline is that correlations above 0.80 may indicate multicollinearity concerns (Dormann et al., 2013). As shown in Table 5, none of the correlation exceed this threshold, suggesting that multicollinearity is not a major issue. Even though no high correlations are found, a VIF test is still needed to check for multicollinearity more accurately. The results of this test are shown in Appendix C.

Table 5: Correlation Matrix

Variables	CSR Decoupling	Integrated thinking	Managerial ability	Firm Size	Leverage	Analyst Coverage	Firm Age
CSR Decoupling		-0.161***	-0.023**	-0.066***	-0.045***	-0.098***	-0.124***
Integrated Thinking	-0.161***		0.123***	0.283***	0.046***	0.346***	0.171***
Managerial Ability	-0.023**	0.123***		0.236***	-0.113***	0.042***	0.058***
Firm Size	-0.066***	0.283***	0.236***		0.129***	0.420***	0.086***
Leverage	-0.045***	0.046***	-0.113***	0.129***		-0.017	-0.064***
Analyst Coverage	-0.098***	0.346***	0.042***	0.420***	-0.017		0.141***
Firm Age	-0.124***	0.171***	0.058***	0.086***	-0.064***	0.141***	

p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

Note: This correlation matrix shows the relationships among all key variables. Significant negative correlations between CSR decoupling and both integrated thinking and managerial ability provide preliminary support for H1.

4.2 Regression result

This section addresses two central research questions: (1) Whether integrated thinking effects CSR decoupling? and (2) Does managerial ability moderates the relationship of integrated thinking and CSR decoupling? To answer these questions, I present results from multilevel mixed-effects regression model. The model assumes linearity and normally distributed residuals. Visual diagnostics, including histogram (see Appendix B1) and normal Quantile-Quantile plot (see Appendix B2) assessments, suggest no major departures from these assumptions, supporting the validity of the estimated coefficients. Furthermore, to ensure the stability of the regression coefficients, VIF test was performed (see Appendix C), with all VIF values falling well below the conventional limit of 10, confirming that multicollinearity is not a significant concern in this analysis.

Table 6 presents the results of three multilevel mixed-effects regression models analyzing the relationship between integrated thinking and CSR decoupling. Model 1 provides a baseline assessment, including only the main independent variable, Integrated Thinking. The result shows a significant and negative association between integrated thinking and CSR decoupling ($\beta = -0.0005$, $p < 0.001$) this initial finding provides strong preliminary support for Hypothesis 1, suggesting that firms with more advanced integrated thinking practices exhibit a smaller gap between their internal and external CSR action.

Model 2 builds on the baseline by introducing managerial ability and its interaction with integrated thinking (IT × MA). In this model, integrated thinking remains a significant negative predictor of CSR decoupling ($\beta = -0.0003$, $p < 0.05$). The coefficient for managerial ability is negative but not statistically significant ($\beta = 0.0002$, $p > 0.1$). These results indicate that while the direct negative effect of integrated thinking on CSR decoupling persists, there is no statistical evidence to support the assumption of managerial ability moderates this relationship. Therefore, Hypothesis 2 is not supported. This finding invites further interpretation, which is discussed in the following section.

Model 3 presents the full model, which includes firm-level control variables as well as industry and year fixed effects. Consistent with previous models, integrated thinking remains a significant negative predictor of CSR decoupling ($\beta = -0.0003$, $p < 0.05$), further reinforcing the support for Hypothesis 1. Several control variables are also statistically significant. Firm size is negatively associated with CSR decoupling ($\beta = -0.0091$, $p < 0.001$), suggesting that larger firms tend to align their internal and external CSR practices more consistently. Firm age is also negatively associated ($\beta = -0.0003$, $p < 0.05$). Finally, leverage ($\beta = -0.0238$, $p < 0.1$) and analyst coverage ($\beta = -0.0006$, $p < 0.1$) show weak negative associations with CSR decoupling.

The inclusion of control variables and fixed effects improves the model's explanatory power, with the marginal R^2 increasing from 0.007 in Model 1 to 0.219 in Model 3, and the conditional R^2 increasing from 0.709 to 0.743, indicating that the full model provides a better fit to the data.

Table 6: Regression Result CSR Decoupling

	CSR Decoupling	CSR Decoupling	Random Coef.
	Model 1	Model 2	Model 3
H1: IT_{it-1}	-0.0005***(0.00)	-0.0003*(0.03)	-0.0003*(0.00)
MA_{it-1}		-0.0002(0.03)	0.0491(0.03)
H2: $IT_{it-1} * MA_{it-1}$		-0.0006(0.00)	-0.0006(0.00)
Firm Size $_{it}$			-0.0090***(0.00)
Leverage $_{it}$			-0.0238(0.01)
Analyst Coverage $_{it}$			-0.0006(0.00)
Firm Age $_{it}$			-0.0003*(0.00)
Industry fixed effects			Included
Year fixed effects			Included
Random firm effects	Included	Included	Included
Random country effects	Included	Included	Included
Intercept	0.0006(0.00)	0.0008(0.01)	-0.0121(0.15)
Observations	10,526	10,526	10,526
R2 Marg.	0.007	0.008	0.219
R2 Cond.	0.709	0.709	0.743

$p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: This table summarizes the regression results testing Hypotheses 1 and 2. Column (1) estimates a multilevel model with only the main independent variable. Column (2) includes the interaction term between Integrated Thinking and Managerial Ability. Column (3) estimates a random coefficient model with full controls and fixed effects

4.3 Result discussion

The aim of this study was to examine the effect of integrated thinking on CSR decoupling, with special attention to whether managerial ability moderates this relationship. Using a panel dataset of 10,526 firm-year observations and a multilevel mixed-effects regression approach, the analysis explored three main questions.

First, the results show a significant and negative association between integrated thinking and CSR decoupling. This suggests that firms that integrate environmental, social, governance issues into their decision-making process are less likely to show inconsistencies between internal CSR practices and external disclosures, supporting the hypothesis that integrated thinking reduces CSR decoupling.

Second, while the study explored the moderating effects of managerial ability, the interaction term between integrated thinking and managerial ability was not statistically significant. This implies that managerial ability, as measured in this study, does not significantly alter the effect of integrated thinking on CSR decoupling. This finding leads to the rejection of Hypothesis 2. One potential reason is that the measurement of managerial ability, integrated

thinking often requires collaboration across departments, long-term planning and aligning financial and non-financial objectives (IIRC, 2013), which beyond the efficiency metrics typically used to assess managerial ability (Demerjian et al., 2012). In addition, governance structures and organizational cultures may influence CSR practices, thereby limiting the influence of individual managers (Reimsbach & Braam, 2023). Institutional factors such as regulatory disclosure requirements or stakeholder motivation may further constrain the determination of managerial ability in this area (Ioannou & Serafeim, 2015). Therefore, the lack of a significant moderating effect of managerial ability may result from both conceptual misalignment in measurement and contextual complexities in corporate governance.

Third, after including firm-level control variables and fixed effects for industry and year, the explanatory power of the model improved, highlighting the importance of accounting for structural differences across firms and external environments.

4.4 Robustness check

To further assess the temporal stability and generalizability of the main findings, a robustness check involved re-estimating the multilevel regression model (Table 6) on a subsample covering more recent period. Following the approach of Baboukardos et al. (2021) and Reimsbach & Braam (2023), this study specifically focused on observations from 2018 onwards. This period is particularly relevant as it captures the latter half of our sample, potentially reflecting increasing public pressures involving integrated thinking practices (IIRC, 2021).

The results of this subsample analysis, presented in Table 7, indicate the main results remain largely robust. The primary negative relationships between integrated thinking and CSR decoupling holds, albeit with reduced statistical significance ($\beta = -0.0003$, $p < 0.1$). Notably, the non-significant moderating effect of managerial ability is consistently observed in the subsample. This result reinforces the credibility of the overall conclusion regarding the impact of integrated thinking on CSR decoupling.

Table 7: Robustness Check Results

	CSR Decoupling	CSR Decoupling	Random Coef.
	Model 1	Model 2	Model 3
H1: IT_{it-1}	-0.0005*** (0.00)	-0.0004* (0.00)	-0.0003 (0.00)
MA_{it-1}		-0.0232 (0.03)	0.0389 (0.04)
H2: $IT_{it-1} * MA_{it-1}$		-0.0004 (0.00)	-0.0005 (0.00)
Firm Size_{it}			-0.0102***(0.00)
Leverage_{it}			-0.0217 (0.02)
Analyst Coverage_{it}			-0.0008 (0.00)
Firm Age_{it}			-0.0003* (0.00)
Industry fixed effects			Included
Year fixed effects			Included
Random firm effects	Included	Included	Included
Random country effects	Included	Included	Included
Intercept	0.0008(0.01)	0.0070(0.01)	-0.0066(0.16)
Observations	7178	7178	7178
R2 Marg.	0.006	0.007	0.232
R2 Cond.	0.796	0.795	0.826

p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

Note: This table presents the results of robustness checks using a sub-sample from 2018 to 2022. Column (1) estimates a multilevel model with only the main independent variable. Column (2) includes the interaction term between Integrated Thinking and Managerial Ability. Column (3) estimates a random coefficient model with full controls and fixed effects.

5 Conclusion

This paper set out to examine whether integrated thinking effects CSR decoupling, and whether this relationship is moderated by managerial ability. Drawing on neo-institutional theory, systems thinking, and the resource-based view, this study provides empirical insights on an international panel of firms from 2013 to 2022.

The findings from a multilevel mixed-effects regression model reveal a strong evidence that integrated thinking is significantly and negatively associated with CSR decoupling. This provides strong support for the primary hypothesis (H1), indicating that firms with higher degree of integrated thinking are more likely to ensure their external CSR actions are consistent with their internal CSR actions. This result suggests that integrated thinking is not merely a symbolic

gesture but a substantive strategic approach that fosters genuine alignment between company's CSR commitments and its operations (Oliver et al., 2016; IIRC, 2021; Dimes & de Villiers, 2024).

However, the study do not find empirical support for Hypothesis 2. The analysis show no significant moderating effect of managerial ability on the relationship between integrated thinking and CSR decoupling. While integrated thinking itself is negatively associated with CSR decoupling, managerial ability, as measured in this study, does not appear to strengthen or weaken this effect.

This study contributes to the academic literature in several ways. First, it is one of the few empirical investigations linking integrated thinking to CSR decoupling on a global scale. Second, it introduces and tests the boundary condition of managerial ability, extending previous studies that have used managerial ability as determinants of CSR performance and disclosure (Sauerwald & Su, 2019; Chen et al., 2020; Gong et al., 2021). Third, the use of panel data from multiple countries enhances the external validity and contextual relevance of the CSR findings.

However, it also acknowledges limitations. The data available limited the scope and depth of the analysis. The measures of integrated thinking and managerial ability relied on proxies that may not capture their full conceptual complexity. Moreover, the availability of firm-level data constrained the sample to a specific set of firms and years, which may affect the generalizability of the results.

Further research could address this limitation by incorporating qualitative or mixed methods approaches to explore how integrated thinking is operationalized within firms. Additionally, examining institutional moderators, such as national regulatory environments, may provide further insight into the conditions under which integrated thinking can negatively affect CSR decoupling. Lastly, refining and expanding the measurement of managerial ability may yield more nuanced understanding of its influence on CSR.

In summary, this study advances the understanding of integrated thinking as a governance mechanism for CSR decoupling and opens new questions for future exploration at the intersection of sustainability, corporate governance, and managerial ability.

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7 Appendix

7.1 Appendix A

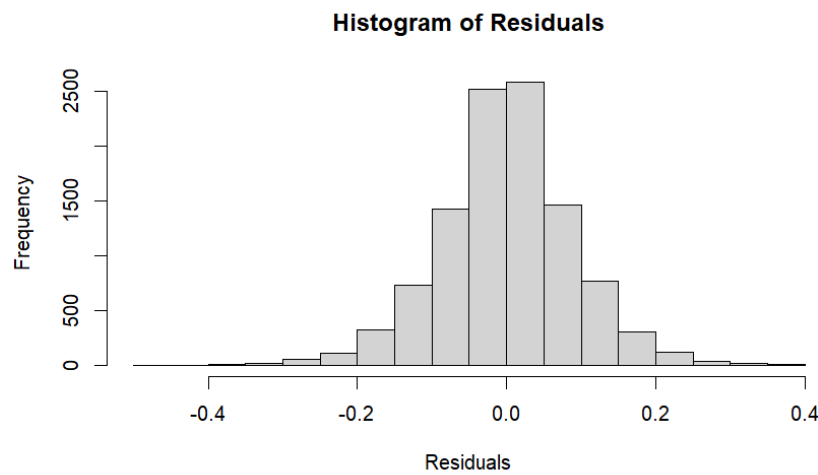
Indicators of internal and external actions (Hawn & Ioannou, 2016; Bothello et al., 2023)

LSEG CODE	Definition
Internal Actions	
CGBFDP019	Percentage of non-executive board members on the audit committee as stipulated by the company.
CGBFDP023	Percentage of non-executive board members on the nomination committee.
CGVSDP005	Does the company have a CSR committee or team?
ENERDP0051	Does the company have a policy to improve emission reduction?
ENRRDP046	Does the company make use of renewable energy?
ENRRDP058	Does the company use environmental criteria (ISO 14000, energy consumption, etc.) in the selection process of its suppliers or sourcing partners?
CGBFO03V	Does the company have an audit committee with at least three members and at least one "financial expert" within the meaning of Sarbanes-Oxley?
CGBSD01V	Does the company have a policy for maintaining a well-balanced membership of the board?
CGBSO07V	Percentage of independent board members as reported by the company.
CGCPD01V	Does the company have a policy for performance-oriented compensation that attracts and retain the senior executives and board members?
CGSRD01V	Does the company have a policy for ensuring equal treatment of minority shareholders, facilitating shareholder engagement or limiting the use of anti-takeover devices?
ENPIDP067	Does the company develop products or technologies that are used for water treatment, purification, or that improve water-use efficiency?
ENRRDP0121	Does the company have a policy to improve its water efficiency?
ENRRDP0122	Does the company have a policy to improve its energy efficiency?
SODODP0081	Does the company have a diversity and equal opportunity policy?
SOHRD01V	Does the company have a policy for the exclusion of child, forced or compulsory labour, or to guarantee the freedom of association universally applied independent of local laws?
SOHSD01V	Does the company have a policy to improve employee health & safety within the company and its supply chain?
SOTDD01V	Does the company have a policy to support the skills training or career development of its employees?

External Actions

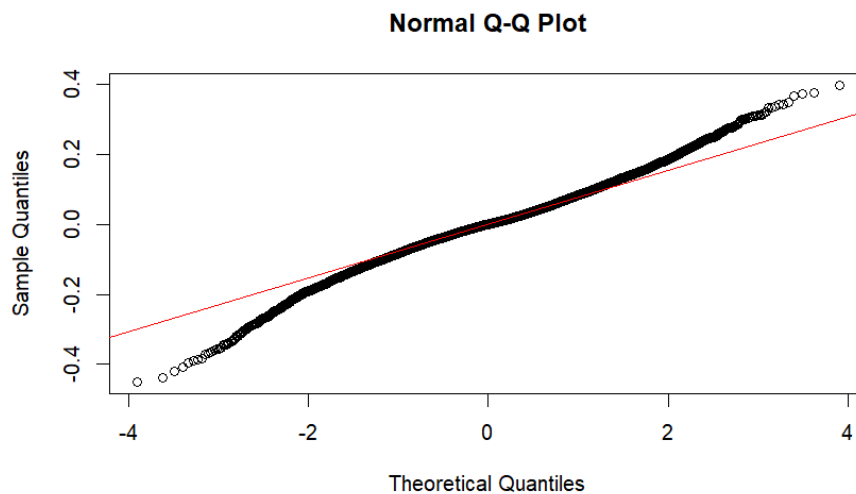
- CGVSDP028** Is the company's CSR report published in accordance with the GRI guidelines?
- CGVSDP029** Does the company's extra-financial report take into account the global activities of the company?
- CGVSDP030** Does the company have an external auditor of its CSR/H&S/Sustainability report?
- ENERDP036** Does the company report on initiatives to reduce, substitute, or phase out volatile organic compounds (VOC)?
- ENERDP081** Does the company report on initiatives to reduce the environmental impact of transportation of its products or its staff?
- ENERDP033** Does the company report on initiatives to reduce, reuse, recycle, substitute, or phase out SO_x (sulphur oxides) or NO_x (nitrogen oxides) emissions?
- ENERDP062** Does the company report on initiatives to recycle, reduce, reuse, substitute, treat, or phase out total waste?
- ENRRDP031** Does the company report on initiatives to reduce, reuse, substitute, or phase out toxic chemicals or substances?
- SOCODP013** Does the company claim to follow the OECD Guidelines for Multinational Enterprises?
- SOCODP053** Does the company report on crisis management systems or reputation disaster recovery plans to reduce or minimize the effects of reputation disasters?
- SODODP026** Does the company claim to provide flexible working hours or working hours that promote a work-life balance?
- SODODP027** Does the company claim to provide day care services for its employees?
- SOHRDP026** Does the company report or show to use human rights criteria in the selection or monitoring process of its suppliers or sourcing partners?
- SOHRDP029** Does the company report or show to be ready to end a partnership with a sourcing partner if human rights criteria are not met?
- SOHSDP039** Does the company report on policies or programs on HIV/AIDS for the workplace or beyond?
- SOPRDP029** Does the company reportedly develop or market products and services that foster specific health and safety benefits for the consumers (healthy, organic or nutritional food, safe cars, etc.)?
- SOTDDP023** Does the company claim to favor promotion from within?
- SOTDDP024** Does the company claim to provide regular staff and business management training for its managers?
-

7.2 Appendix B



Appendix B1. Histogram of Residuals

Notes: This histogram displays the distribution of the residuals from the final multilevel mixed-effects model (Model 3 from Table 6). The distribution looks roughly centered around zero, which supports the normality assumption. Any minor skewness observed isn't substantial enough to compromise the validity of our model's findings.



Appendix B2. Normal Quantile-Quantile Plot

Notes: This Normal Quantile-Quantile (Q-Q) plot shows the points generally align well with the reference line, especially in the central range. Small departures at the tails are normal in large datasets and don't suggest a major issue. Therefore, this plot provides good evidence that our residuals are roughly normally distributed..

7.3 Appendix C

VIF test results

Variable	VIF	1/VIF
Integrated thinking	1.186	0.843
Managerial ability	1.095	0.913
Firm Size	1.342	0.745
Leverage	1.053	0.950
Analyst Coverage	1.321	0.757
Firm Age	1.048	0.954
Integrated Thinking : Managerial Ability	1.013	0.987
Mean	1.145	

7.4 Appendix D

Variables used to construct Managerial Ability (Demerjian et al., 2012)

Variable	Definition	Data Source
COGS	Cost of Goods Sold, scaled by total assets. Used as an input in the DEA model to measure operational efficiency.	Datastream
SG&A	Selling, General, and Administrative Expenses, scaled by total assets. Input variable in the DEA model.	Datastream
PPE	Net value of Property, Plant, and Equipment, scaled by total assets. Input variable in the DEA model.	Datastream
Goodwill	Reported goodwill, scaled by total assets. Input variable in the DEA model.	Datastream
Sales	Total firm revenues. Used as output in the DEA model to calculate efficiency.	Datastream
Size	Natural log of total assets. Control variable in the second-stage regression to isolate non-managerial effects.	Datastream
Market Share	Firm's sales divided by total industry sales. Used in second-stage regression to control for competitive position.	Datastream
Free Cash Flow	Operating cash flow minus capital expenditures. Used as a control in the second-stage regression.	Datastream
Age	Natural log of (current year – year of incorporation). Control variable in the second-stage regression.	Datastream
Business Segments	Number of distinct business segments the firm operates in. Controls for organizational complexity in the second-stage regression.	Datastream
Foreign Currency	Indicator variable denoting whether the firm operates in foreign currency markets. Used as a proxy for international exposure in the second stage.	Datastream

7.5 Appendix E

This appendix provides a detailed account of the use of Generative AI tools during the development and writing of this thesis. These tools were used to support coding, data analysis, and the refinement of language, ensuring clarity and precision in the presentation of findings. All outputs generated were critically evaluated and, where necessary, modified by myself to align with the objectives of this research.

Details of the use of Generative AI tools

Aspect	Details
Tool Used	ChatGPT 4.0
Purpose of Use	Refining the language of the thesis Grammar and punctuation correction Enhancing sentence structure and clarity Improving academic tone and word choice
My Role	AI generated suggestions were critically reviewed and revised before inclusion. No sections were directly copied verbatim without editing.
Scope of Use	Applied during the revision stage only
My Reflection	AI helped me to better structure my text, and to be more concise in writing while expressing the same content
Review	All AI-assisted edits were manually reviewed by the author
