The effects of mandatory non-financial reporting on financial performance. A multidimensional investigation on global agri-food companies

Received 22 June 2022
Revised 15 November 2022
Accepted 21 December 2022

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Abstract

Purpose – Focusing on the Agri-Food and Beverage sector, the paper investigates the direct effect of worldwide mandatory non-financial disclosure on several financial dimensions as well as its moderating effects on the relationship between sustainability and financial performance.

Design/methodology/approach – The authors performed fixed-effect regressions on a sample of 180 global listed companies, considering a period of eight years. The authors also tested the moderating effects of non-financial disclosure regulation on the relationship between sustainability and financial performance.

Findings – The authors found a positive direct impact of mandatory non-financial disclosure on Operating Return on Asset, Return on Equity and Return on Sales. The analysis also highlighted the negative moderating effects of non-financial reporting regulation on the relationship between sustainability issues and financial performance. As for the Cost of Debt, the authors found mixed results.

Research limitations/implications – This study considers a short-term perspective focusing on a limited sample composed of companies playing a key role in the global agri-food system.

Practical implications – The paper identifies which financial performance dimensions are positively or negatively affected by mandatory non-financial disclosure. Accordingly, managers can rearrange corporate activities to deal with further reporting normative requirements concurrently preserving financial performances and fostering corporate sustainability.

Social implications – This study recommends fostering mandatory non-financial disclosure to increase corporate transparency fostering the sustainability transition of the Agri-Food and Beverage industry.

Originality/value – The paper highlights global mandatory non-financial disclosure effects on financial performance considering a sector that is cross-cutting impactful on plural sustainability issues.

Keywords Mandatory non-financial disclosure, Sustainability and financial performance, Fixed-effects regression and moderation analysis

Paper type Research paper

1. Introduction

In recent years, sustainability has become a priority for worldwide companies since stakeholders, consumers and policy makers are increasingly paying attention to the non-financial aspects of business management. In this regard, a turning point is represented by the launch of the 2030 Agenda, in September 2015, with which 193 countries around the world committed themselves to pursuing 17 sustainable development goals by 2030. Moreover, the Paris Agreement and the Cop 26 fostered the international commitment to reach the carbon neutrality by the year 2050. Companies play a key role in reaching the above-mentioned

British Food Journal
Vol. 125 No. 13, 2023
pp. 99-124
Emerald Publishing Limited
0007-070X
DOI 10.1108/BFJ-06-2022-0545

goals, shifting the socio-economic systems toward sustainability. In the wake of such institutional endorsement, the normative pressures on sustainability business practices strengthened worldwide. The emblem of this evolution is represented by the compulsory non-financial disclosure (Van der Lugt *et al.*, 2020). With this requirement, the institutions intend to increase the level of transparency of company activities, reducing information asymmetries between companies and their stakeholders and enhancing managerial awareness (Cupertino *et al.*, 2022a). However, sustainability reporting can entail costs for companies (De Micco *et al.*, 2021; Jayaraman and Wu, 2019). Therefore, several scholars have begun to question the economic and financial consequences of non-financial disclosure. In this regard, mixed pieces of evidence have been found since scholars are divided between those who advocate the beneficial effects of non-financial disclosure (e.g. Ioannou and Serafeim, 2017; Raimo *et al.*, 2021) and those who point out its harmful effects (e.g. Jayaraman and Wu, 2019). Accordingly, there is no clear understanding of how non-financial disclosure affect financial performance (e.g. Buallay, 2020; Cupertino *et al.*, 2022a; Singh and Chakraborty, 2021). Moreover, little evidence has still been found regarding the mandatory nature of non-financial disclosure and its effects on financial performance. This lack further amplify the research problem since a regulatory imposition can significantly affect business profitability (e.g. Jayaraman and Wu, 2019). In particular, a mandatory disclosure can generate direct and indirect effects that can positively or negatively affect business performance (Cupertino *et al.*, 2022a).

Consequently, there is the need to further understand whether and how mandatory non-financial disclosure affects a company's financial and non-financial performance. Bridging such a research gap is of great importance as it allows to understand which companies' performance dimensions the mandatory disclosure affects most and allows managers to identify the appropriate actions to maximize corporate sustainability and transparency while preserving profitability. In the light of the current economic and energy crisis (dictated by post-Covid and war conflicts respectively), ensuring this trade-off is more important than ever.

Despite the key importance of this topic, very few papers deal with the direct effect of mandatory non-financial disclosure on financial performance, and even lesser focus on its moderating effects on the relationship between sustainability and financial performance. Indeed, to the best of our knowledge, only Cupertino *et al.* (2022a) and Oware and Mallikarjunappa (2022) investigated such relationships limiting their analysis to single geographic areas (Europe and India respectively). Nevertheless, the mandatory non-financial disclosure is interesting in most countries of the world, and the several national and supra-national laws are converging toward the topics identified in the international policy acts such as Agenda 2030, Paris Agreement and Cop 26 (e.g. Van der Lugt *et al.*, 2020). Moreover, companies, especially the biggest and the listed ones, operate in globalised markets in which stakeholders and investors have strong expectations about sustainability issues (e.g. Grewal *et al.*, 2019). Accordingly, the country-specific focus adopted so far limits a broader and more comprehensive knowledge of the phenomenon. Indeed, a global investigation on mandatory non-financial disclosure direct effects on financial performance and on its role in moderating the relationship between sustainability and financial performance is definitively needed. The present paper addresses these research gaps showing, in a global perspective, how mandatory social and environmental disclosures directly and indirectly affect different businesses' performance. In so doing, the paper focuses on the Agri-Food and Beverage (AF&B) industry. The focus on this sector has several motivations. Firstly, prior studies underlined the need to analyse the investigated phenomenon focusing on single industries since the relationship between sustainability practices and financial performance can be strongly sector specific (Buallay, 2020; Tuppura *et al.*, 2016). There is no "one size fit all" sustainability solution and each industry have complex and different logics (Buallay, 2020).

Therefore, each sector needs to be studied individually to better appreciate its peculiarities and to better understand its complexity (Tuppura *et al.*, 2016). Moreover, the AF&B companies are extremely sensitive to sustainability since they can worsen climate change and simultaneously be affected by environmental and social issues (Cupertino *et al.*, 2021). However, the sustainable transition of AF&B firms is still weak due to the loss of profitability they usually suffer (e.g. Gangi *et al.*, 2021). For these reasons, it is more necessary than ever to focus on the AF&B industry in analysing if companies manage to be sustainable and transparent while remaining profitable.

The paper developed ordinary least-square regressions on a sample of 180 global listed companies, considering a timeframe of eight years (namely 2012–2020). We also tested the moderating effects of mandatory non-financial disclosure on the relationship between sustainability and financial performance.

The paper contributes to the current literature showing how mandatory social and environmental disclosures affect financial performance from a worldwide standpoint. Moreover, adopting a multidimensional analytical approach, it highlights which micro sustainability aspects affect different dimensions of financial performance related to specific stakeholders' categories (i.e. owners, managers, customers, debtholders). Lastly, the paper is among the few studies that show which moderating effects the mandatory non-financial disclosure (divided among social and environmental) has on the relationship between sustainability and financial performance.

The paper is structured as follows: Section 2 presents the research background; Section 3 explains the data collection process and the methodology used for the empirical analysis; Section 4 shows the main results of our study; in Section 5 the results are discussed; Section 6 highlights some concluding remarks, managerial implications and future research developments.

2. Research background

Within the Corporate Social Responsibility (CSR) practices deepened in the literature, sustainability reporting is among the most currently investigated (e.g. Buallay, 2020; Cupertino *et al.*, 2022a; Paolone *et al.*, 2021). This practice has long been on a voluntary basis (e.g. Giacosa *et al.*, 2017) but, over the years, it has undergone a worldwide spread due to increasing international regulation on the disclosure of non-financial information (e.g. Directive 2014/95/EU, Grenelle II Act, King III in Europe, France and South Africa respectively) (Van der Lugt *et al.*, 2020). Accordingly, over the years, the literature has focused on various aspects related to sustainability reporting. Academics have investigated aspects such as the quality of disclosure following the entry into force of a specific legislation (e.g. Chauvey *et al.*, 2015; Venturelli *et al.*, 2017), the reasons that lead companies to adopt this practice (e.g. Duran and Rodrigo, 2018; Thorne *et al.*, 2014) and the effects produced in terms of legitimacy (e.g. Cho and Patten, 2007; De Villiers and Alexander, 2014). Some studies also deepened how and when business sustainability practices (such as sustainability reporting) affect a firm's risks (e.g. Dobler *et al.*, 2015; Nirino *et al.*, 2022a) while others analysed to what extent prior non-financial performance affects subsequent non-financial disclosure (Clarkson *et al.*, 2008; Moussa *et al.*, 2021). Recently, a peculiar research stream arose regarding the effects of Environmental, Social and Governance (ESG) disclosure on financial performance (e.g. Buallay, 2020; Cupertino *et al.*, 2022a; Singh and Chakraborty, 2021). This research stream is particularly important since it revives a long-standing debate, or the relationship between sustainability practices and financial performance. Although this relationship has been studied extensively over the last few decades, the debate is still open and scholars are striving to understand what elements can potentially affect this relationship (e.g. Cupertino *et al.*, 2022b; Nirino *et al.*, 2022b).

On the relationship between non-financial reporting and financial performance, multiple and contrasting pieces of evidence have been found. Buallay (2020) found mixed results, showing that ESG disclosure positively affects the operational, financial and market performance in the manufacturing sector while negatively affecting the operational, financial and market performance in the banking sector. Singh and Chakraborty (2021) found that ESG disclosure has a positive effect on accounting measures of financial performance (i.e. ROA and ROE) while it has no statistically significant effects on market measures (i.e. Tobin's Q). Raimo *et al.* (2021) studied the effect of ESG disclosure on the cost of debt. They found that a higher level of transparency of ESG disclosure is associated with a lower cost of debt. Unlike previous studies, Murray *et al.* (2006) highlighted that there is no direct relationship between share returns and ESG disclosure. Similarly, Asuquo *et al.* (2018) found that environmental and social performance disclosure produced no significant effects on financial performance.

With the advent of mandatory non-financial disclosure in many parts of the world, scholars have begun to investigate the effects that the regulation on sustainability reporting has had on corporate performance. Notably, Grewal *et al.* (2019) underlined a negative market reaction to the enactment of the legislation on non-financial disclosure. Jayaraman and Wu (2019) argued that mandatory non-financial disclosure increased costs and produced a lower investment efficiency. Differently from these last insights, Ioannou and Serafeim (2017) pointed out that the regulation on non-financial disclosure fosters investors to provide capital for those companies committed to ESG performance improvement. Focusing on Chinese energy companies, Fonseka *et al.* (2019) deepened the effects of mandatory environmental disclosure on the cost of debt, finding a significant negative association.

In the European context, Phan *et al.* (2020) have investigated the effects of mandatory non-financial disclosure (fostered by the Directive 2014/95/EU) on the financial performance of the Italian companies, finding no evidence. Cupertino *et al.* (2022a) deepened the direct effect of the European non-financial disclosure regulation on financial performance, as well as its moderation effect on the relationship between corporate sustainability and financial performance. They found that the non-financial disclosure regulation directly and negatively affected firms' operating profitability and shareholder value, but it positively moderated the relationship between corporate sustainability performance and financial performance, partially mitigating its direct negative effects. Similarly, Oware and Mallikarjunappa (2022) investigated the moderation effect that mandatory sustainability reporting had on the relationship between CSR expenditure and the financial performance of listed firms in India. They found that mandatory sustainability reporting had no moderation effects on the relationship between CSR expenditure and ROA and Tobin's Q, but it positively moderated the relationship between CSR expenditure and stock price return. Finally, Goel (2021) investigated the impact of sustainability reporting on several dimensions of financial performance distinguishing between pre- and post-disclosure reform periods in India. Goel (2021) found that sustainability reporting positively affected the financial parameters of return on sales (ROS), ROE and Tobin's Q in pre-reform period while no significant effect was found in the post-reform period.

Considering this background, it emerges that scarce and controversial evidence has been found regarding how mandatory non-financial disclosure affects companies' financial performance. Furthermore, most of the papers on this topic limited their investigations to single geographic areas (e.g. Cupertino *et al.*, 2022a; Oware and Mallikarjunappa, 2022; Phan *et al.*, 2020; Singh and Chakraborty, 2021). Accordingly, there is a lack of worldwide analysis explaining such a phenomenon. Such a broad perspective is essential since non-financial disclosure has been mandatory for several years in much of the world (see Table 1). In particular, since this obligation has existed in many countries for over 10 years (see Table 1), the time has come to understand its effects on performance, showing whether and how sustainability affects profitability. Understanding this trade-off is fundamental especially in

the current period of crisis in which cost containment and the rationalization of resources have become the imperative for worldwide companies but, at the same time, environmental and social problems are more in the limelight than ever. Therefore, this paper aims to analyse the effects of mandatory non-financial disclosure on companies' financial performance from a global perspective to give a comprehensive overview on whether and how companies can be sustainable and normative compliant without compromising their profitability. In so doing, the authors focused on a specific sector, namely the AF&B, which is particularly sensitive to sustainability and profitability issues (e.g. Cupertino *et al.*, 2021; Gangi *et al.*, 2021).

2.1 Non-financial disclosure and financial performance in the agri-food and beverage industry

The AF&B industry is a peculiar sector that is strongly affected by sustainability issues (e.g. Cupertino *et al.*, 2021; Gangi *et al.*, 2021; Tuppura *et al.*, 2016), especially in terms of financial performance (e.g. Gangi *et al.*, 2021). Accordingly, several scholars have recently begun to analyse the impact of AF&B corporate sustainability on financial performance (e.g. Buallay, 2022a; Cupertino *et al.*, 2021; Garzón- Jiménez and Zorio-Grima, 2022; Nirino *et al.*, 2020; Raimo *et al.*, 2020). Cupertino *et al.* (2021) found that corporate sustainability issues produced positive effects on financial performance for those companies that are long-standing practitioners being the best ESG performers. They also found substantial negative effects of corporate sustainability practices on financial performance for those companies that are less sustainability-oriented being the worst ESG performers. Nirino *et al.* (2020) found mixed results highlighting that corporate social practices positively affect firms' performance but environmental practices had no or negative impacts on AF&B companies' financial performance. Partalidou *et al.* (2020) investigated the impact of different dimensions of CSR on the financial performance of AF&B companies. They found a positive relationship between environmental and financial performance. Tuppura *et al.* (2016) found that sustainability performance does not influence financial performance in AF&B companies, and this could be due to communication difficulties that affect the AF&B industry. Accordingly, improving communication could foster the causality between corporate sustainability practices and financial performance in this sector (Tuppura *et al.*, 2016).

In line with this assumption, recent studies focused on the AF&B companies' disclosure practices, deepening their effects on financial performance. Raimo *et al.* (2020) investigated whether and how ESG disclosure affects the cost of equity of the AF&B companies, finding significant negative effects. In the same line of thinking, Garzón- Jiménez and Zorio-Grima (2022) expanded Raimo *et al.* (2020) insights, enlarging the sample and considering both developed and developing countries. They found that AF&B companies with better environmental disclosure and performance benefited from the cost of equity reduction. Conversely, AF&B companies with higher environmental footprints are penalised with higher equity costs. Finally, Buallay (2022a) analysed the relationship between ESG disclosure and different dimensions of financial performance. Buallay (2022a) found that ESG disclosure positively affected AF&B companies' Return on Equity while no significant relationship was found between ESG disclosure and operational and market performance.

The literature on the relationship between sustainability reporting and financial performance in the AF&B industry is still in its infancy. Only a few papers deal with this topic and, to the best of our knowledge, none of them focuses on the mandatory nature of the non-financial disclosure and its impact on AF&B firms' financial performance. In short, poor evidence exists on the effects of mandatory non-financial disclosure on companies' financial performance from a global perspective and even less regarding the AF&B industry. Accordingly, this paper aims to contribute to the current debate exploring the

impact of mandatory non-financial disclosure worldwide on AF&B companies' financial performance.

Following the evidence of prior studies such as Buallay (2022b), Cupertino *et al.* (2021), Garzón- Jiménez and Zorio-Grima (2022), Raimo *et al.* (2020) and Tuppura *et al.* (2016) we formulated the following research hypotheses:

H1a. Mandatory non-financial disclosure positively impacts the financial performance of global AF&B companies.

H1b. Mandatory non-financial disclosure negatively impacts the financial performance of global AF&B companies.

H2a. Non-financial performance has a positive impact on financial performance in global AF&B companies.

H2b. Non-financial performance has a negative impact on financial performance in global AF&B companies.

Inspired by the studies of Cupertino *et al.* (2022a) and Oware and Mallikarjunappa (2022), we also investigated the moderation effect of mandatory non-financial disclosure on the impact that sustainability performance has on the financial ones, formulating the following hypotheses:

H3a. Mandatory non-financial disclosure positively moderates the relationship between non-financial and financial performance in global AF&B companies.

H3b. Mandatory non-financial disclosure negatively moderates the relationship between non-financial and financial performance in global AF&B companies.

For the stake of brevity, the authors use the term "relationship" to identify the univocal impact of sustainability performance on the financial ones even if, traditionally, such a term points out bidirectional interactions. In the next section, the methodological aspects of this paper are presented.

3. Data and method

3.1 Data collection

Given the purpose of this study, we firstly developed a mapping of non-financial disclosure regulations in force around the world and over time. To this end, we relied upon the "Carrots and Sticks" database freely accessible on the web (i.e. https://www.carrotsandsticks.net/). This overview allowed us to elaborate a database of national non-financial disclosure legislations, clustering environmental and social disclosure regulations as well as identifying the year of the normative enactment (see Table 1). Accordingly, we set the analysis distinguishing between the companies' voluntary and mandatory approaches to non-financial disclosure.

Moreover, relying on Refinitiv Eikon Datastream Worldscope and Asset4®, we collected data about 467 listed AF&B companies worldwide. Nevertheless, we excluded some of these companies from the final sample due to financial and/or non-financial missing data. We finally built a panel data containing 180 global AF&B listed companies' annual observations, considering a time span of 8 years (i.e. from 2012–2013 to 2019–2020) (see Table 2). This panel data is strongly balanced as all the scrutinised companies have data for all observed years. The final statistical sub-population obtained, for the sake of brevity, hereinafter is labelled "sample". The geographical distribution characterising our sample is reported in Table 1. Therefore, our analysis focuses on companies that operate in all AF&B sub-sectors (see Table 3) and both OECD and non-OECD countries.

Country	Companies	%	Cum.	Year of environmental disclosure regulation enactment	Year of social disclosure regulation enactment	Legislation name
Australia	7	3.89	3.89	2007	2012	*National Greenhouse and Energy Reporting* (Env.)*; Workplace Gender Equality Act* (Soc.)
Belgium	2	1.11	5	1995	2008	*Article 4.1.8 of VLAREM II* (Env.); *The Social Balance Sheet* (Soc.)
Brazil	7	3.89	8.89	–	–	
Canada	5	2.78	11.67	1999	–	*The Greenhouse Gas Emissions Reporting Program* (Env.)
Chile	4	2.22	13.89	2014	2016	*Circular No. 52 Referencia Legal Ley N 20.780* (Env.); *Norma de Carácter General N° 386* (Soc.)
China	2	1.11	15	2008	–	*Measures on Open Environmental Information and Guidelines on Listed Companies' Environmental Information Disclosure* (Env.)
Colombia	1	0.56	15.56	–	2018	*Law 1955 - National Action Plan for Development 2018–2022* (Soc.)
Denmark	1	0.56	16.11	2008	2008	*The Danish Financial Statements Act* (Env. and Soc.)
Finland	1	0.56	16.67	1997	1997	*The Finnish Accounting Act* (Env. and Soc.)
France	6	3.33	20	2003 and 2010	2003 and 2010	*Nouvelles Régulations Économiques #2001–420 (NRE) and Grenelle Act II (2010)* (Env. and Soc.)
Germany	1	0.56	20.56	2010	2010	SD-KPI Standard 2010–2014 (Env. and Soc.)
Hong Kong	8	4.44	25	–	–	
India	4	2.22	27.22	1986 and 2003	–	*Environment (Protection) Act, Annual "environmental audit report" (1986) and Corporate Responsibility for Environmental Protection (CREP) (2003)* (Env.)
Indonesia	3	1.67	28.89	2012	2012	*Regulation no. 47/2012* (Env. and Soc.)
Ireland	3	1.67	30.56	2016	2016	*Transposition of EU NFR Directive* (Env. and Soc.)
Italy	1	0.56	31.11	2016	2016	*Transposition of EU NFR Directive: Legislative Decree 30 December 2016, n. 254* (Env. and Soc.)

(*continued*)

Table 1. Geographical distribution and legislations' details

Country	Companies	%	Cum.	Year of environmental disclosure regulation enactment	Year of social disclosure regulation enactment	Legislation name
Japan	23	12.78	43.89	2005	2015	*Mandatory GHG Accounting System and Law Concerning the Promotion of Business Activities with Environmental Consideration* (Env.); *Act on Promotion of Female Employment* (Soc.)
Malaysia	6	3.33	47.22	2015	2015	*Amendments to Main Market Listing Requirements relating to Sustainability Statement in Annual Reports and Issuance of the Sustainability Reporting Guide and Toolkits* (Env. and Soc.)
Mexico	5	2.78	50	2005 and 2012	–	*Pollutant Release and Transfer Register (PRTR) (Registro de Emisiones y Transferencia de Contaminantes), 2005 and Climate Change law, 2012* (Env.)
Netherlands	4	2.22	52.22	2005	2005	*EU Modernization Directive (2003/51/EC)* (Env. and Soc.)
Norway	2	1.11	53.33	2013	2013	*Act amending the Norwegian Accounting Act* (Env. and Soc.)
Philippines	2	1.11	54.44	–	2011	*Corporate Social Responsibility Act, 2011.* (Soc.)
Poland	2	1.11	55.56	2016	2016	*Transposition of EU NFR Directive: Amendments to the Accounting Act* (Env. and Soc.)
Russia	2	1.11	56.67	–	–	
Singapore	5	2.78	59.44	2012	2016	*Energy Conservation Act, 2012* (Env.); *SGX-ST Listing Rules Practice Note 7.6 Amendments to Sustainability Reporting Guide* (Env. and Soc.)
South Africa	10	5.56	65	2010	2010	*King III Code* (Env. and Soc.)
South Korea	6	3.33	68.33	2012	–	*Environmental Information Disclosure Policy, 2012* (Env.)

Table 1. (*continued*)

Country	Companies	%	Cum.	Year of environmental disclosure regulation enactment	Year of social disclosure regulation enactment	Legislation name
Spain	2	1.11	69.44	2007	2007	*National Accounting Plan* (Env. and Soc.)*; Spanish Organic Law 3/2007 for Effective Equality between Women and Men* (Soc.)
Switzerland	7	3.89	73.33	–	–	
Taiwan	3	1.67	75	–	–	
Thailand	2	1.11	76.11	–	–	
Turkey	1	0.56	76.67	2006	2012	*Environment Law No. 2872 of 1983, amended by law No. 5491* (Env.); *Occupational Health and Safety Law No. 6331, 2012.* (Soc.)
United Kingdom	15	8.33	85	2013	2013	*The Companies Act 2006 Regulations 2013* (Env. and Soc.)
United States	27	15	100	2010	1972	*Mandatory Greenhouse Gas Reporting Rule* (Env.); *SECTION 709(c), Title VII, Civil Rights Act of 1967 as Amended by the Equal Employment Opportunity Act of 1972* (Soc.)
Total	*180*	*100*				

Table 1.

Sampling process

Time	Companies with ESG missing data	Companies with CFP missing data	Companies with missing ESG and CFP missing data	Final yearly Unbalanced sample	Final yearly balanced sample
2012–2013	259	2	261	206	180
2013–2014	255	3	258	209	180
2014–2015	243	4	247	220	180
2015–2016	207	5	212	255	180
2016–2017	173	6	179	288	180
2017–2018	131	9	140	327	180
2018–2019	97	19	116	351	180
2019–2020	12	21	33	434	180

Table 2.
Sampling process

Industry	Companies	%	Cum.
Beverages	38	21.11	21.11
Drug and Grocery Stores	32	17.78	38.89
Food Producers	83	46.11	85
Retailers	27	15	100
Total	*180*	100	

Table 3.
Industry distribution

3.2 Methodology

For this study, we developed a panel data analysis based on different models that vary due to the inclusion of different predictors and explanatory variables as well as the dummy variable used to examine the mandatory non-financial reporting effects.

Focusing on the dependent variable side, we used *Operating Return on Assets* (*OROA*), *Return on Equity* (*ROE*), *Return on Sales* (*ROS*) and *Cost of Debt* as dependent variables in line with prior scholars' insights (e.g. Buallay, 2022b; Cupertino *et al.*, 2022a; Goel, 2021). We included different predictors in our analysis to examine the effects of non-financial disclosure regulation and corporate sustainability on distinct companies' financial dimensions related respectively to the standpoints of managers, shareholders, customers and debtholders. This methodological approach follows prior studies' insights (e.g. Cupertino *et al.*, 2022a) that highlighted how the reporting of different ESG aspects can produce plural effects on different financial performances.

Moreover, as explanatory variables, we included alternatively in the analysis specific non-financial performance proxies to better appreciate how the multiple dimensions of sustainability affect companies' financial performances, testing H2a/b. Notably, we included in our analytical models as independent variables sustainability scores provided by Refinitiv Eikon Datastream Asset4® (Refinitiv, 2022) that assess particular corporate environmental and social issues, such as: sustainable internal business production and procurement processes (i.e. *ResourceUseScore*); Greenhouse Gases (GHGs) emissions mitigation (i.e. *EmissionScore*); environmental corporate innovation (i.e. *EnvInnovScore*); the integration of customer's health and safety, integrity, and data privacy in quality goods and services productions (i.e. *ProductRespScore*); human resources sustainable management (i.e. *WorkforceScore, HumanRightScore*); and corporate citizenship (i.e. *CommunityScore*).

As for mandatory non-financial disclosure effects, we followed the approach of Cupertino *et al.* (2022a) using appropriate independent dummy variables to assess direct and moderating non-financial disclosure regulation effects. We included a variable that takes value 1, in the case of a company is obliged to disclose its environmental or social performance, while 0 if in the examined period any non-financial disclosure regulation is enacted in the operating context. Therefore, we designed two dichotomous independent variables, such as *EnvRegulation* and *SocRegulation*, to study respectively the direct effects of mandatory environmental and social disclosure produced on financial performance, finding evidence for H1a/b. We also used these dummy variables to check for moderating effects of non-financial disclosure regulation on the relationship between ESG and financial performance, validating H3a/b.

Our study included some control variables to prevent any endogeneity problems, also verifying other possible side effects on the investigated relationships. Since management commitment and corporate sustainability strategy can have significant impacts on financial and non-financial performance (e.g. Cupertino *et al.*, 2021), we included two control variables that refer respectively to the managerial commitment (i.e. *ManagementScore*) and the strategic approach (i.e. *CSRStrategycore*) towards sustainability. Furthermore, since the firm's size is widely recognized as remarkably impactful on both sustainability practices and financial performance (Buallay, 2022b), we chose it as the third control variable. Specifically, we used the natural logarithm of market value (*lnMV*) as a control variable inherent in the firm's size. Further, we used some accounting-based proxies of slack resources as other control variables, since the more a firm has additional resources the more it can invest in sustainability performance improvement. Accordingly, we used *CashFlowSales* to estimate operational available slack resources, and *QuickRatio* as a measure of financial available slack resources (Bourgeois and Singh, 1983). Finally, we used *Industry* dummy variables to check for any AF&B sub-sectors specific features and effects on the scrutinised relationships (Andersen and Dejoy, 2011). Finally, we set a one-year lag between predictor and explanatory

variables for each analytical model. This setting was useful to better understand the short-term effects of prior non-financial activities on subsequent financial performance as well as to minimise possible residual endogeneity effects (Cupertino *et al.*, 2022a). The following Table 4 summarises the description of the variables.

As the first step of the analysis, we performed a Pearson correlation test to get a first overview of the linear associations between the scrutinised variables. In performing the pairwise correlations analysis, we considered three levels of statistical significance ($p < 0.01$, $p < 0.05$, $p < 0.1$). Industry dummies proved to be not statistically significant and thus related results have not been reported in the following covariance matrix. We tested possible collinearity biases in each model of the analysis, highlighting mean variance inflation factors values less than 4. Therefore, this diagnosis allowed us to ignore multicollinearity problems within the scrutinised variables for each model used in the study in line with the insights of Hair *et al.* (2014). The following Table 5 reports the main descriptive statistics, while Table 6 shows the Pearson correlation test results. Moreover, following the suggestions of Clark and Linzer (2015), we performed the Hausman test to adopt the appropriate regression method opting between fixed and random effects. Finding no significant differences between the two statistical approaches, we used the fixed effects technique in each linear regression carried out. Every analysis step has been performed using STATA software.

To validate our research hypotheses, we firstly designed four main models that were assumed as dependent variables respectively *OROA* (**Model 1**), *ROE* (**Model 2**), *ROS* (**Model 3**) and *Cost of Debt* (**Model 4**). Moreover, we defined seven variants of each model (i.e. **A**, **B**, **C**, **D**, **E**, **F**, **G**). Model variants **A**, **B**, **C** and **D** aim to examine possible correlations between financial performance and different environmental independent variables. Simultaneously, model variants **E**, **F** and **G** analyse the plausible effects of some social explanatory variables on financial performance. Furthermore, each model variant considers the direct effects of mandatory non-financial disclosure on financial performance. Notably, model variants **A**, **B**, **C** and **D** include the environmental regulation dichotomous independent variable (i.e. *EnvRegulation*). Differently, model variants **E**, **F** and **G** distinguish for the presence of dummy explanatory variable *SocRegulation*. As for moderating effects of mandatory non-financial disclosure, model variants **A**, **B**, **C** and **D** include composite independent variables designed as the multiplication between *EnvRegulation* and each corporate environmental explanatory variable (i.e. *ResourceUseScore*, *EmissionScore*, *EnvInnovScore* and *ProductRespScore*). Similarly, model variants **E**, **F** and **G** have composite independent variables useful to examine possible effects of the interaction between *SocRegulation* and corporate social independent variables (i.e. *WorkforceScore, HumanRightScore* and *CommunityScore*).

Adopting such a methodological approach, we correlated all the environmental and social independent variables with all the financial performance dependent variables. Furthermore, in each model variant, we checked for the unobservable effects of time-invariant firm and/or industry-specific features, through the assumed control variables. The following Tables 7 and 8 show the equations of the models characterising our analysis.

4. Results

Our study showed evidence on the direct impacts of both ESG performance and mandatory non-financial reporting on *OROA*, *ROE*, *ROS* and *Cost of Debt*. Moreover, we found some moderating effects of mandatory environmental or social disclosure on the relationship between non-financial and financial performance. Tables 9 and 10 report the main results of the empirical analysis carried out.

The evidence highlighted that the non-financial disclosure regulation had a generally positive effect on *OROA*. Therefore, results validated H1a. More specifically, environmental

Variables	Description	Role played in the analysis
OROA	It is an efficiency and profitability ratio [i.e. (earnings before interest and taxes) /(the annual average value of total assets) *100]. Notably, this measure estimates the operating profit that a firm generates investing in its assets to develop the business	Dependent Variable
ROE	It is another profitability ratio [i.e. (Net income – Preferred Dividend Requirements)/(Average of last years' and current year's Common Equity) * 100]. Notably, this indicator expresses the firm's capability in using its equity to generate profits for shareholders	Dependent Variable
ROS	It is a proxy of corporate operational efficiency that estimates the firm's capability in generating profit from sales through strategies fostering customers' attraction/loyalty [i.e. (operating profits)/(net sales) * 100]	Dependent Variable
Cost of Debt	It assesses the return that the firm may ensure for its debtholders and creditors measured as the ratio between Total interest Cost Incurred and the Total Debt	Dependent Variable
EnvRegulation	It is the dummy variable that takes value 1 when there is a mandatory NFD regulation including environmental aspects, while it takes value 0 in case of the absence of a mandatory NFD regulation treating environmental aspects	Independent Variable
SocRegulation	It is the dummy variable that identifies the NFD mandatory regime containing social aspects from the taking value 1, differently it is defined as equal to 0 to highlight the absence of mandatory NFD regulation including social aspects	Independent Variable
ResourcesUseScore	It reflects in terms of percentage (i.e. 0–100%) the firm's capability in rationalizing the employment of production inputs, as well as the ability to redesign procurement activities through the adoption of eco-friendly solutions	Independent Variable
EmissionsScore	It assesses in terms of percentage (i.e. 0–100%) the corporate commitment and effectiveness to decarbonise production and operational processes	Independent Variable
EnvInnovScore	It reflects in terms of percentage (0–100%) the corporate capability to introduce eco-friendly technologies as well as in redesigning products in a sustainable manner	Independent Variable
WorkforceScore	It measures in terms of percentage (0–100%) the corporate attitude to foster employees' social welfare, ensuring diversity and equal treatments, as well as enhancing workforce's engagement	Independent Variable
HumanRightScore	It estimates in terms of percentage (0–100%) the firm's compliance with fundamental human rights conventions	Independent Variable
CommunytyScore	It measures in terms of percentage (0–100%) the corporate citizenship attitude, preserving public well-being and executing business ethics principles	Independent Variable
ProdRespScore	It expresses in terms of percentage (0–100%) the corporate capability to maintaining customer's health and safety, as well as ensuring integrity and data privacy, through higher quality standards of goods and services	Independent Variable
CSRStrategyScore	It measures in terms of percentage (0–100%) the corporate attitude to consider financial as well as environmental, social and governance issues defining and implementing firm's strategies	Control Variable
ManagementScore	It assesses in terms of percentage (0–100%) the managerial attitude to run business according to sustainability principles	Control Variable

Table 4.
Scrutinised variables

(*continued*)

Variables	Description	Role played in the analysis
CashFlowSales	It estimates the corporate capability in generating operational additional resources through cash flow from sales suitable to support the business development (Bourgeois and Singh, 1983)	Control Variable
QuickRatio	It is defined as a ratio between current assets available to cover current liabilities in order to estimate the corporate attitude in generating financial available additional resources useful for developing business activities (Bourgeois and Singh, 1983)	Control Variable
lnMV	It represents the natural log of the market value of the company's equity. We computed this size proxy in the logarithmic form to normalize data	Control Variable

Table 4.

Variables	Mean	Median	Standard deviation	Variance	Min	Max
OROA	7.19822	7.454408	13.15004	172.9236	−233.3737	47.05816
ROE	12.85384	11.065	20.75804	430.8962	−144.27	243.38
ROS	3.828614	6.960751	58.70538	3446.322	−1201.56	56.696
CostOfDebt	37.62735	23.83026	68.30132	4665.07	0	1347.951
EnvRegulation	0.7486111	1	0.4339623	0.1883233	0	1
SocRegulation	0.5819444	1	0.4934108	0.2434542	0	1
ResourceUseScore	50.27711	52.125	30.81511	949.5711	0	99.8
EmissionsScore	49.72867	51.16	30.16823	910.1218	0	99.8
EnvInnovScore	30.2986	21.45	32.4849	1055.269	0	95.59
WorkforceScore	57.93297	60.42	27.04276	731.3109	1.1	99.83
HumanRightScore	36.56363	32.66	34.24723	1172.872	0	98.68
CommunityScore	52.58971	53.635	30.24213	914.5864	0	99.83
ProdRespScore	54.54786	58.26	30.78155	947.5037	0	99.74
CashFlowSales	7.823424	8.18	28.8015	829.5266	−555.23	46.68
QuickRatio	0.9099236	0.75	0.9155238	0.8381838	0.06	15.08
CSRStrategyScore	47.88364	49.13	31.59971	998.5419	0	99.59
ManagementScore	54.0357	54.675	26.965	727.1112	0.6	99.74
lnMV	8.51344	8.519685	1.403744	1.970498	1.373716	12.61276

Table 5.
Descriptive statistics

regulation presented a positive direct correlation with *OROA* in all the Models ($\mathbf{1_A}$, $\mathbf{1_B}$, $\mathbf{1_C}$, $\mathbf{1_D}$). Environmental issues also proved to be positively correlated with *OROA* since the variables expressing the environmental dimension of sustainability (i.e. *ResourceUseScore*, *EmissionScore*, *EnvInnovScore* and *ProductRespScore*) present statistically significant and positive values. These findings supported H2a. Contextually, the positive association between environmental sustainability and *OROA* is negatively moderated by the regulation on environmental disclosure. This evidence supported H3b. From the social perspective, regulation had a positive direct impact on *OROA* as well as social sustainability variables (*WorkforceScore*, *HumanRightScore* and *CommunityScore*) had a generally positive effect on operating financial performance. These findings thus validated H1a and H2a. Simultaneously, results highlighted that the regulation on social disclosure negatively moderates the relationship between corporate social activities and operating financial performance, validating H3b.

From the shareholder standpoint, the regulation on non-financial disclosure also had a general direct positive impact on financial performance in line with H1a. Both regulations on

Table 6.
Pearson correlation results

Variables	OROA	ROE	ROS	CostOfDebt	EnvRegul.	SocRegul.	ResourceUseS.	EmissionsS.	EnvInn.S.	WorkforceS.	HumanR.S.	CommunityS.	ProdRespS.	CashFlowSales	QuickRatio	CSRStr.Score	Managem.S.	lnMV
OROA	1																	
ROE	0.650***	1																
ROS	0.702***	0.382***	1															
CostOfDebt	0.007	0.000	0.029	1														
EnvRegulation	0.100***	0.077***	0.018	0.129***	1													
SocRegulation	0.074***	0.085***	−0.004	0.077***	0.463***	1												
ResourceUseScore	0.110***	0.154***	0.138***	−0.071***	0.047*	0.179***	1											
EmissionsScore	0.115***	0.117***	0.145***	0.030	0.069***	0.182***	0.778***	1										
EnvInnovScore	0.064**	0.130***	0.066**	0.054**	0.199***	0.183***	0.514***	0.505***	1									
WorkforceScore	0.137***	0.151***	0.120***	−0.096***	−0.039	0.232***	0.706***	0.670***	0.317***	1								
HumanRightsScore	0.102***	0.110***	0.102***	−0.045*	0.122***	0.159***	0.659***	0.565***	0.406***	0.593***	1							
CommunityScore	0.167***	0.235***	0.114***	−0.156***	0.107***	0.139***	0.592***	0.456***	0.364***	0.557***	0.566***	1						
ProdRespScore	0.071***	0.148***	0.076***	0.016	0.166***	0.182***	0.648***	0.563***	0.480***	0.364***	0.506***	0.451***	1					
CashFlowSales	0.025	0.066**	0.010	−0.055**	0.040	0.127***	0.305***	0.236***	0.221***	0.226***	0.232***	0.286***	0.277***	1				
QuickRatio	0.099***	0.136***	0.116***	−0.077***	0.104***	0.195***	0.654***	0.612***	0.411***	0.619***	0.583***	0.554***	0.520***	0.276***	1			
CSRStrategyScore	0.480***	0.286***	0.725***	0.030	−0.018	−0.028	0.124***	0.135***	0.076***	0.104***	0.111***	0.105***	0.090***	0.019	0.110***	1		
ManagementScore	−0.288***	−0.201***	−0.613***	0.023	−0.064**	−0.036	−0.213***	−0.171***	−0.121***	−0.206***	−0.172***	−0.204***	−0.171***	−0.103***	−0.189***	−0.476***	1	
lnMV	0.334***	0.322***	0.321***	0.020	0.183***	0.158***	0.480***	0.416***	0.402***	0.315**	0.488***	0.412***	0.385***	0.168***	0.446***	0.307***	−0.308***	1

Models	Equations
$\mathbf{1_A}$	$(\text{OROA})_{i,t} = \alpha_0 + \alpha_1(\text{EnvRegulation})_{i,t-1} + \alpha_2(\text{ResourceUseScore})_{i,t-1} + \alpha_3(\text{EnvRegulation}*\text{ResourceUseScore})_{i,t-1} + \alpha_4(\text{CashFlowsSales})_{i,t-1} + \alpha_5(\text{QuickRatio})_{i,t-1} + \alpha_6(\text{CSRStrategyScore})_{i,t-1} + \alpha_7(\text{ManagementScore})_{i,t-1} + \alpha_8(\text{lnMV})_{i,t-1} + \alpha_9 \sum_{k=1}^{4} \text{Industry}_{i,t-1} + \varepsilon_{i,t-1}$
$\mathbf{2_A}$	$(\text{ROE})_{i,t} = \beta_0 + \beta_1(\text{EnvRegulation})_{i,t-1} + \beta_2(\text{ResourceUseScore})_{i,t-1} + \beta_3(\text{EnvRegulation}*\text{ResourceUseScore})_{i,t-1} + \beta_4(\text{CashFlowsSales})_{i,t-1} + \beta_5(\text{QuickRatio})_{i,t-1} + \beta_6(\text{CSRStrategyScore})_{i,t-1} + \beta_7(\text{ManagementScore})_{i,t-1} + \beta_8(\text{lnMV})_{i,t-1} + \beta_9 \sum_{k=1}^{4} \text{Industry}_{i,t-1} + \varepsilon_{i,t-1}$
$\mathbf{3_A}$	$(\text{ROS})_{i,t} = \text{Ƙ}_0 + \text{Ƙ}_1(\text{EnvRegulation})_{i,t-1} + \text{Ƙ}_2(\text{ResourceUseScore})_{i,t-1} + \text{Ƙ}_3(\text{EnvRegulation}*\text{ResourceUseScore})_{i,t-1} + \text{Ƙ}_4(\text{CashFlowsSales})_{i,t-1} + \text{Ƙ}_5(\text{QuickRatio})_{i,t-1} + \text{Ƙ}_6(\text{CSRStrategyScore})_{i,t-1} + \text{Ƙ}_7(\text{ManagementScore})_{i,t-1} + \text{Ƙ}_8(\text{lnMV})_{i,t-1} + \text{Ƙ}_9 \sum_{k=1}^{4} \text{Industry}_{i,t-1} + \varepsilon_{i,t-1}$
$\mathbf{4_A}$	$(\text{Cost of Debt})_{i,t} = \gamma_0 + \gamma_1(\text{EnvRegulation})_{i,t-1} + \gamma_2(\text{ResourceUseScore})_{i,t-1} + \gamma_3(\text{EnvRegulation}*\text{ResourceUseScore})_{i,t-1} + \gamma_4(\text{CashFlowsSales})_{i,t-1} + \gamma_5(\text{QuickRatio})_{i,t-1} + \gamma_6(\text{CSRStrategyScore})_{i,t-1} + \gamma_7(\text{ManagementScore})_{i,t-1} + \gamma_8(\text{lnMV})_{i,t-1} + \gamma_9 \sum_{k=1}^{4} \text{Industry}_{i,t-1} + \varepsilon_{i,t-1}$
$\mathbf{1_B}$	$(OROA)_{i,t} = \delta_0 + \delta_1(EnvRegulation)_{i,t-1} + \delta_2(EmissionsScore)_{i,t-1} + \delta_3(EnvRegulation*EmissionsScore)_{i,t-1} + \delta_4(CashFlowsSales)_{i,t-1} + \delta_5(QuickRatio)_{i,t-1} + \delta_6(CSRStrategyScore)_{i,t-1} + \delta_7(ManagementScore)_{i,t-1} + \delta_8(lnMV)_{i,t-1} + \delta_9 \sum_{k=1}^{4} Industry_{i,t-1} + \varepsilon_{i,t-1}$
$\mathbf{2_B}$	$(ROE)_{i,t} = \zeta_0 + \zeta_1(EnvRegulation)_{i,t-1} + \zeta_2(EmissionsScore)_{i,t-1} + \zeta_3(EnvRegulation*EmissionsScore)_{i,t-1} + \zeta_4(CashFlowsSales)_{i,t-1} + \zeta_5(QuickRatio)_{i,t-1} + \zeta_6(CSRStrategyScore)_{i,t-1} + \zeta_7(ManagementScore)_{i,t-1} + \zeta_8(lnMV)_{i,t-1} + \zeta_9 \sum_{k=1}^{4} Industry_{i,t-1} + \varepsilon_{i,t-1}$
$\mathbf{3_B}$	$(ROS)_{i,t} = \mathcal{E}_0 + \mathcal{E}_1(EnvRegulation)_{i,t-1} + \mathcal{E}_2(EmissionsScore)_{i,t-1} + \mathcal{E}_3(EnvRegulation*EmissionsScore)_{i,t-1} + \mathcal{E}_4(CashFlowsSales)_{i,t-1} + \mathcal{E}_5(QuickRatio)_{i,t-1} + \mathcal{E}_6(CSRStrategyScore)_{i,t-1} + \mathcal{E}_7(ManagementScore)_{i,t-1} + \mathcal{E}_8(lnMV)_{i,t-1} + \mathcal{E}_9 \sum_{k=1}^{4} Industry_{i,t-1} + \varepsilon_{i,t-1}$
$\mathbf{4_B}$	$(Cost\ of\ Debt)_{i,t} = \eta_0 + \eta_1(EnvRegulation)_{i,t-1} + \eta_2(EmissionsScore)_{i,t-1} + \eta_3(EnvRegulation*EmissionsScore)_{i,t-1} + \eta_4(CashFlowsSales)_{i,t-1} + \eta_5(QuickRatio)_{i,t-1} + \eta_6(CSRStrategyScore)_{i,t-1} + \eta_7(ManagementScore)_{i,t-1} + \eta_8(lnMV)_{i,t-1} + \eta_9 \sum_{k=1}^{4} Industry_{i,t-1} + \varepsilon_{i,t-1}$
$\mathbf{1_C}$	$(OROA)_{i,t} = \theta_0 + \theta_1(EnvRegulation)_{i,t-1} + \theta_2(EnvInnovScore)_{i,t-1} + \theta_3(EnvRegulation*EnvInnovScore)_{i,t-1} + \theta_4(CashFlowsSales)_{i,t-1} + \theta_5(QuickRatio)_{i,t-1} + \theta_6(CSRStrategyScore)_{i,t-1} + \theta_7(ManagementScore)_{i,t-1} + \theta_8(lnMV)_{i,t-1} + \theta_9 \sum_{k=1}^{4} Industry_{i,t-1} + \varepsilon_{i,t-1}$
$\mathbf{2_C}$	$(ROE)_{i,t} = \iota_0 + \iota_1(EnvRegulation)_{i,t-1} + \iota_2(EnvInnovScore)_{i,t-1} + \iota_3(EnvRegulation*EnvInnovScore)_{i,t-1} + \iota_4(CashFlowsSales)_{i,t-1} + \iota_5(QuickRatio)_{i,t-1} + \iota_6(CSRStrategyScore)_{i,t-1} + \iota_7(ManagementScore)_{i,t-1} + \iota_8(lnMV)_{i,t-1} + \iota_9 \sum_{k=1}^{4} Industry_{i,t-1} + \varepsilon_{i,t-1}$
$\mathbf{3_C}$	$(ROS)_{i,t} = \vartheta_0 + \vartheta_1(EnvRegulation)_{i,t-1} + \vartheta_2(EnvInnovScore)_{i,t-1} + \vartheta_3(EnvRegulation*EnvInnovScore)_{i,t-1} + \vartheta_4(CashFlowsSales)_{i,t-1} + \vartheta_5(QuickRatio)_{i,t-1} + \vartheta_6(CSRStrategyScore)_{i,t-1} + \vartheta_7(ManagementScore)_{i,t-1} + \vartheta_8(lnMV)_{i,t-1} + \vartheta_9 \sum_{k=1}^{4} Industry_{i,t-1} + \varepsilon_{i,t-1}$

(*continued*)

Table 7.
Models of the study focused on environmental sustainability dimension

Models	Equations
$\mathbf{4_C}$	$(Cost\ of\ Debt)_{i,t} = \lambda_0 + \lambda_1(EnvRegulation)_{i,t-1} + \lambda_2(EnvInnovScore)_{i,t-1} + \lambda_3(EnvRegulation{*}EnvInnovScore)_{i,t-1} + \lambda_4(CashFlowsSales)_{i,t-1} + \lambda_5(QuickRatio)_{i,t-1} + \lambda_6(CSRStrategyScore)_{i,t-1} + \lambda_7(ManagementScore)_{i,t-1} + \lambda_8(lnMV)_{i,t-1} + \lambda_9 \sum_{k=1}^{4} Industry_{i,t-1} + \varepsilon_{i,t-1}$
$\mathbf{1_D}$	$(OROA)_{i,t} = \mu_0 + \mu_1(EnvRegulation)_{i,t-1} + \mu_2(ProductRespScore)_{i,t-1} + \mu_3(EnvRegulation{*}ProductRespScore)_{i,t-1} + \mu_4(CashFlowsSales)_{i,t-1} + \mu_5(QuickRatio)_{i,t-1} + \mu_6(CSRStrategyScore)_{i,t-1} + \mu_7(ManagementScore)_{i,t-1} + \mu_8(lnMV)_{i,t-1} + \mu_9 \sum_{k=1}^{4} Industry_{i,t-1} + \varepsilon_{i,t-1}$
$\mathbf{2_D}$	$(ROE)_{i,t} = \nu_0 + \nu_1(EnvRegulation)_{i,t-1} + \nu_2(ProductRespScore)_{i,t-1} + \nu_3(EnvRegulation{*}ProductRespScore)_{i,t-1} + \nu_4(CashFlowsSales)_{i,t-1} + \nu_5(QuickRatio)_{i,t-1} + \nu_6(CSRStrategyScore)_{i,t-1} + \nu_7(ManagementScore)_{i,t-1} + \nu_8(lnMV)_{i,t-1} + \alpha_{10} \sum_{k=1}^{4} Industry_{i,t-1} + \varepsilon_{i,t-1}$
$\mathbf{3_D}$	$(ROS)_{i,t} = \phi_0 + \phi_1(EnvRegulation)_{i,t-1} + \phi_2(ProductRespScore)_{i,t-1} + \phi_3(EnvRegulation{*}ProductRespScore)_{i,t-1} + \phi_4(CashFlowsSales)_{i,t-1} + \phi_5(QuickRatio)_{i,t-1} + \phi_6(CSRStrategyScore)_{i,t-1} + \phi_7(ManagementScore)_{i,t-1} + \phi_8(lnMV)_{i,t-1} + \phi_9 \sum_{k=1}^{4} Industry_{i,t-1} + \varepsilon_{i,t-1}$
$\mathbf{4_D}$	$(Cost\ of\ Debt)_{i,t} = \xi_0 + \xi_1(EnvRegulation)_{i,t-1} + \xi_2(ProductRespScore)_{i,t-1} + \xi_3(EnvRegulation{*}ProductRespScore)_{i,t-1} + \xi_4(CashFlowsSales)_{i,t-1} + \xi_5(QuickRatio)_{i,t-1} + \xi_6(CSRStrategyScore)_{i,t-1} + \xi_7(ManagementScore)_{i,t-1} + \xi_8(lnMV)_{i,t-1} + \xi_9 \sum_{k=1}^{4} Industry_{i,t-1} + \varepsilon_{i,t-1}$

Table 7.

environmental and social disclosure positively and significantly affected the *ROE*. Environmental and social activities also proved to be significatively and positively correlated to the *ROE* (except for *HumanRightScore* which showed no statistically significant value). These findings thus validated H2a. The regulations on environmental and social disclosure negatively moderated the positive relationship between sustainability issues and *ROE*. Therefore, this evidence supported H3b.

Results showed also that customers positively reacted to mandatory non-financial disclosure. Both mandatory environmental and social disclosures have a positive and significant direct effect on *ROS*, validating H1a. Furthermore, the analysis highlighted that *ROS* is positively influenced by some sustainable corporate activities such as reducing GHGs emissions, ensuring employees' safety and being a good citizen. These results supported H2a. Further, findings showed little moderating effects of non-financial disclosure regulation. Specifically, only mandatory environmental disclosure produced a significant moderating effect, negatively influencing the relationship between *EmissionScore* and *ROS* as supposed in H3b.

Considering the *Cost of Debt*, the study produced mixed findings that partially validated the research hypotheses. The analysis carried out using **Models $\mathbf{5_A}$, $\mathbf{5_B}$, $\mathbf{5_C}$, $\mathbf{5_D}$, $\mathbf{6_A}$, $\mathbf{6_B}$, $\mathbf{6_C}$** produced results presenting lower statistical significance compared to the other regression' outputs. Nevertheless, results supported H1a showing that the regulation on environmental disclosure positively affects the *Cost of Debt* in the short-term, contrasting with prior studies evidence (e.g. Raimo *et al.*, 2021). Likewise, sustainable-oriented practices (expressed by the variables *ResourceUseScore, EmissionScore*, *EnvInnovScore* and *ProductRespScore*) tend to increase the *Cost of Debt*, validating what is supposed in H2a. Furthermore, findings highlighted that mandatory environmental disclosure produced little significant moderating effects on the relationship between corporate environmental activities and the *Cost of Debt*. Specifically, it mitigates the *Cost of Debt* increase induced by *ResourceUseScore* as assumed

Models	Equations
$\mathbf{1_E}$	$(OROA)_{i,t} = \rho_0 + \rho_3(SocRegulation)_{i,t-1} + \rho_2(WorkforceScore)_{i,t-1} + \rho_3(SocRegulation*WorkforceScore)_{i,t-1} + \rho_4(CashFlowsSales)_{i,t-1} + \rho_5(QuickRatio)_{i,t-1} + \rho_6(CSRStrategyScore)_{i,t-1} + \rho_7(ManagementScore)_{i,t-1} + \rho_8(lnMV)_{i,t-1} + \rho_9 \sum_{k=1}^{4} Industry_{i,t-1} + \varepsilon_{i,t-1}$
$\mathbf{2_E}$	$(ROE)_{i,t} = \varsigma_0 + \varsigma_1(SocRegulation)_{i,t-1} + \varsigma_2(WorkforceScore)_{i,t-1} + \varsigma_3(SocRegulation*WorkforceScore)_{i,t-1} + \varsigma_4(CashFlowsSales)_{i,t-1} + \varsigma_5(QuickRatio)_{i,t-1} + \varsigma_6(CSRStrategyScore)_{i,t-1} + \varsigma_7(ManagementScore)_{i,t-1} + \varsigma_8(lnMV)_{i,t-1} + \varsigma_9 \sum_{k=1}^{4} Industry_{i,t-1} + \varepsilon_{i,t-1}$
$\mathbf{3_E}$	$(ROS)_{i,t} = \mathsf{F}_0 + \mathsf{F}_1(SocRegulation)_{i,t-1} + \mathsf{F}_2(WorkforceScore)_{i,t-1} + \mathsf{F}_3(SocRegulation*WorkforceScore)_{i,t-1} + \mathsf{F}_4(CashFlowsSales)_{i,t-1} + \mathsf{F}_5(QuickRatio)_{i,t-1} + \mathsf{F}_6(CSRStrategyScore)_{i,t-1} + \mathsf{F}_7(ManagementScore)_{i,t-1} + \mathsf{F}_8(lnMV)_{i,t-1} + \mathsf{F}_9 \sum_{k=1}^{4} Industry_{i,t-1} + \varepsilon_{i,t-1}$
$\mathbf{4_E}$	$(Cost\,of\,Debt)_{i,t} = \sigma_0 + \sigma_1(SocRegulation)_{i,t-1} + \sigma_2(WorkforceScore)_{i,t-1} + \sigma_3(SocRegulation*WorkforceScore)_{i,t-1} + \sigma_4(CashFlowsSales)_{i,t-1} + \sigma_5(QuickRatio)_{i,t-1} + \sigma_6(CSRStrategyScore)_{i,t-1} + \sigma_7(ManagementScore)_{i,t-1} + \sigma_8(lnMV)_{i,t-1} + \sigma_9 \sum_{k=1}^{4} Industry_{i,t-1} + \varepsilon_{i,t-1}$
$\mathbf{1_F}$	$(OROA)_{i,t} = \tau_0 + \tau_1(SocRegulation)_{i,t-1} + \tau_2(HumanRightsScore)_{i,t-1} + \tau_3(SocRegulation*HumanRightsScore)_{i,t-1} + \tau_4(CashFlowsSales)_{i,t-1} + \tau_5(QuickRatio)_{i,t-1} + \tau_6(CSRStrategyScore)_{i,t-1} + \tau_7(ManagementScore)_{i,t-1} + \tau_8(lnMV)_{i,t-1} + \tau_9 \sum_{k=1}^{4} Industry_{i,t-1} + \varepsilon_{i,t-1}$
$\mathbf{2_F}$	$(ROE)_{i,t} = \upsilon_0 + \upsilon_1(SocRegulation)_{i,t-1} + \upsilon_2(HumanRightsScore)_{i,t-1} + \upsilon_3(SocRegulation*HumanRightsScore)_{i,t-1} + \upsilon_4(CashFlowsSales)_{i,t-1} + \upsilon_5(QuickRatio)_{i,t-1} + \upsilon_6(CSRStrategyScore)_{i,t-1} + \upsilon_7(ManagementScore)_{i,t-1} + \upsilon_8(lnMV)_{i,t-1} + \upsilon_9 \sum_{k=1}^{4} Industry_{i,t-1} + \varepsilon_{i,t-1}$
$\mathbf{3_F}$	$(ROS)_{i,t} = \varrho_0 + \varrho_1(SocRegulation)_{i,t-1} + \varrho_2(HumanRightsScore)_{i,t-1} + \varrho_3(SocRegulation*HumanRightsScore)_{i,t-1} + \varrho_4(CashFlowsSales)_{i,t-1} + \varrho_5(QuickRatio)_{i,t-1} + \varrho_6(CSRStrategyScore)_{i,t-1} + \varrho_7(ManagementScore)_{i,t-1} + \varrho_8(lnMV)_{i,t-1} + \varrho_9 \sum_{k=1}^{4} Industry_{i,t-1} + \varepsilon_{i,t-1}$
$\mathbf{4_F}$	$(Cost\,of\,Debt)_{i,t} = \varphi_0 + \varphi_1(SocRegulation)_{i,t-1} + \varphi_2(HumanRightsScore)_{i,t-1} + \varphi_3(SocRegulation*HumanRightsScore)_{i,t-1} + \varphi_4(CashFlowsSales)_{i,t-1} + \varphi_5(QuickRatio)_{i,t-1} + \varphi_6(CSRStrategyScore)_{i,t-1} + \varphi_7(ManagementScore)_{i,t-1} + \varphi_8(lnMV)_{i,t-1} + \varphi_9 \sum_{k=1}^{4} Industry_{i,t-1} + \varepsilon_{i,t-1}$
$\mathbf{1_G}$	$(OROA)_{i,t} = \chi_0 + \chi_1(SocRegulation)_{i,t-1} + \chi_2(CommunityScore)_{i,t-1} + \chi_3(SocRegulation*CommunityScore)_{i,t-1} + \chi_4(CashFlowsSales)_{i,t-1} + \chi_5(QuickRatio)_{i,t-1} + \chi_6(CSRStrategyScore)_{i,t-1} + \chi_7(ManagementScore)_{i,t-1} + \chi_8(lnMV)_{i,t-1} + \chi_9 \sum_{k=1}^{4} Industry_{i,t-1} + \varepsilon_{i,t-1}$
$\mathbf{2_G}$	$(ROE)_{i,t} = \psi_0 + \psi_1(SocRegulation)_{i,t-1} + \psi_2(CommunityScore)_{i,t-1} + \psi_3(SocRegulation*CommunityScore)_{i,t-1} + \psi_4(CashFlowsSales)_{i,t-1} + \psi_5(QuickRatio)_{i,t-1} + \psi_6(CSRStrategyScore)_{i,t-1} + \psi_7(ManagementScore)_{i,t-1} + \psi_8(lnMV)_{i,t-1} + \psi_9 \sum_{k=1}^{4} Industry_{i,t-1} + \varepsilon_{i,t-1}$

(*continued*)

Table 8.
Models of the study focused on social sustainability dimension

Table 8.

Models	Equations
3_G	$(ROS)_{i,t} = \lambda_0 + \lambda_1(SocRegulation)_{i,t-1} + \lambda_2(CommunityScore)_{i,t-1} + \lambda_3(SocRegulation*CommunityScore)_{i,t-1} + \lambda_4(CashFlowsSales)_{i,t-1} + \lambda_5(QuickRatio)_{i,t-1} + \lambda_6(CSRStrategyScore)_{i,t-1} + \lambda_7(ManagementScore)_{i,t-1} + \lambda_8(lnMV)_{i,t-1} + \lambda_9 \sum_{k=1}^{4} Industry_{i,t-1} + \varepsilon_{i,t-1}$
4_G	$(Costof Debt)_{i,t} = \omega_0 + \omega_1(SocRegulation)_{i,t-1} + \omega_2(CommunityScore)_{i,t-1} + \omega_3(SocRegulation*CommunityScore)_{i,t-1} + \omega_4(CashFlowsSales)_{i,t-1} + \omega_5(QuickRatio)_{i,t-1} + \omega_6(CSRStrategyScore)_{i,t-1} + \omega_7(ManagementScore)_{i,t-1} + \omega_8(lnMV)_{i,t-1} + \omega_9 \sum_{k=1}^{4} Industry_{i,t-1} + \varepsilon_{i,t-1}$

in H3b. From the social perspective, the study found that the regulation on social disclosure induced a direct negative effect on the *Cost of Debt*. This evidence validated H1b. Moreover, the analysis produced results in line with H2b, showing that corporate social sustainability negatively affects the *Cost of Debt* especially when companies implement activities suitable to improve employees' working conditions (*WorkforceScore*) and initiatives aimed at producing benefits for the community (*CommunityScore*). Differently, the study showed no statistically significant values regarding *HumanRightScore*. On the other hand, findings highlighted the moderation effect of the mandatory social disclosure partially reduced the positive effects of social business practices in reducing the *Cost of Debt*. Specifically, the regulation downsizes the positive effects of the welfare activities on the reduction of the *Cost of Debt* as assumed in H3b.

5. Discussion

In the light of the evidence presented in the previous section, we found that, in contrast with Cupertino *et al.* (2022a) and Goel (2021), non-financial disclosure regulation had a positive effect on operating profitability and shareholders' returns. An explanation of this result can be that the regulation obliged companies to be transparent about their internal practices, reducing information asymmetries. This, in turn, induced managers to optimise their internal process and their resource use practices, better allocating human, natural and financial capitals. Such an increase in efficiency led to a reduction in management costs and, consequently, to an increase in operating and shareholder profitability. This evidence is even more strong in the AF&B sector since its peculiar attitude to both affect and be strictly affected by social and environmental issues. Accordingly, the optimisation of resource use in production and procurement activities and the mitigation of carbon emissions may improve profitability (Cupertino *et al.*, 2021), as well as the implementation of social sustainability welfare practices can enhance employees' productivity. Furthermore, since product responsibility-related activities (*ProductRespScore*) are positively and significatively impactful on the *OROA*, the company's capacity to produce quality goods/services represents another predictor of short-term operating profitability improvements.

These findings are partially in line with those highlighted by scholars who support a positive relationship between sustainability and financial performance (Buallay, 2022a; Cupertino *et al.*, 2021; Partalidou *et al.*, 2020) while partially contrasting the studies pointing out no or negative relationship between non-financial and financial issues (Asuquo *et al.*, 2018; Murray *et al.*, 2006; Tuppura *et al.*, 2016). Despite the positive direct effects of the non-financial disclosure (in both environmental and social perspectives) regulation on *OROA* and *ROE*, its moderation effects partially downsized those positive impacts. Considering both *OROA* and *ROE*, the non-financial disclosure regulation negatively moderated the positive relationships

IVs & CVs	Model 1A DV: ORAA	Model 1a DV: ORAA	Model 1c DV: ORAA	Model 1D DV: ORAA	Model 2A DV: ROE	Model 2a DV: ROE	Model 2c DV: ROE	Model 2D DV: ROE	Model 4A DV: ROS	Model 4a DV: ROS	Model 4c DV: ROS	Model 4D DV: ROS	Model 5A DV: CostOfDebt	Model 5a DV: CostOfDebt	Model 5c DV: CostOfDebt	Model 5D DV: CostOfDebt
EnvRegulation	2.59***	2.44***	2.14***	2.54***	4.16***	3.75	2.89***	3.63***	1.16***	1.60***	0.79***	1.07***	4.89***	2.30	2.22*	3.03
	(0.53)	(0.52)	(0.36)	(0.56)	(1.10)	(1.08)	(0.74)	(1.15)	(0.38)	(0.37)	(0.25)	(0.40)	(2.02)	(1.97)	(1.34)	(2.12)
ResourceUseScore	0.02*				0.05***				−0.009				0.01***			
	(0.009)				(0.02)				(0.006)				(0.03)			
EmissionsScore		0.01*				0.03*				0.01*				0.08**		
		(0.01)				(0.02)				(0.006)				(0.03)		
EnvInnovScore			0.02**			0.08***					−0.007				0.10***	
			(0.01)			(0.02)					(0.006)				(0.03)	
ProductRespScore				0.03***				0.07***				−0.001				0.08**
				(0.01)				(0.02)				(0.006)				(0.03)
EnvRegulation*ResourceUseScore	−0.03***				−0.08***				−0.01**				−0.06*			
	(0.01)				(0.02)				(0.007)				(0.04)			
EnvRegulation*EmissionsScore		−0.03**				−0.07***				−0.02***				0.0005		
		(0.01)				(0.02)				(0.006)				(0.04)		
EnvRegulation*EnvInnovScore			−0.04***				−0.11***				−0.008				−0.05	
			(0.01)				(0.02)				(0.007)				(0.04)	
EnvRegulation*ProductRespScore				−0.03***				−0.07***				−0.01				−0.03
				(0.01)				(0.02)				(0.007)				(0.04)
CashFlowsSales	0.21***	0.21***	0.21***	0.21***	0.18***	0.18***	0.18***	0.19***	0.97***	0.88***	0.87***	0.88***	0.05**	0.04**	0.04**	0.05**
	(0.005)	(0.01)	(0.005)	(0.005)	(0.01)	(0.01)	(0.01)	(0.01)	(0.005)	(0.005)	(0.005)	(0.005)	(0.02)	(0.02)	(0.02)	(0.02)
QuickRatio	−0.33**	−0.30*	−0.27*	−0.09	−1.08***	−1.11***	−1.2***	−0.95***	0.31*	0.43***	0.41***	0.46	0.49	0.41	0.27	0.54
	(0.16)	(0.16)	(0.16)	(0.16)	(0.33)	(0.33)	(0.33)	(0.33)	(0.13)	(0.13)	(0.13)	(0.13)	(0.61)	(0.60)	(0.60)	(0.61)
CSRStrategyScore	−0.01***	−0.01**	−0.01***	−0.02***	−0.02**	−0.02*	−0.03***	−0.04***	−0.002	0.001	0.0004	0.001	0.002	−0.02	0.01	0.005
	(0.005)	(0.01)	(0.005)	(0.005)	(0.01)	(0.01)	(0.009)	(0.009)	(0.004)	(0.004)	(0.003)	(0.003)	(0.02)	(0.02)	(0.02)	(0.02)
ManagementScore	−0.0002	0.0001	0.001	−0.0003	0.01	0.01	0.01	0.01	−0.004	−0.006	−0.004	−0.004	−0.04**	−0.03	−0.03*	−0.04*
	(0.005)	(0.005)	(0.005)	(0.005)	(0.009)	(0.01)	(0.009)	(0.009)	(0.003)	(0.003)	(0.003)	(0.003)	(0.02)	(0.02)	(0.02)	(0.02)
lnMV	0.95***	0.95***	0.97***	0.87***	2.68***	2.70***	2.59***	2.49***	0.49***	0.59***	0.66***	0.59***	1.93***	1.91***	1.83***	1.91***
	(0.11)	(0.10)	(0.11)	(0.10)	(0.22)	(0.22)	(0.22)	(0.21)	(0.08)	(0.07)	(0.08)	(0.08)	(0.41)	(0.39)	(0.40)	(0.40)
Beverages	§	§	§	−1.33***	§	§	§	−4.09***	0.92***	1.34***	1.46***	1.05***	§	§	§	0.53
				(0.41)				(0.84)	(0.31)	(0.31)	(0.31)	(0.30)				(1.55)
DrugGroceryStores	1.36***	1.39***	1.41***	§	4.49***	4.53***	4.24***	§	0.36	0.28	0.29	§	0.30	0.29	−0.07	§
	(0.40)	(0.40)	(0.40)		(0.83)	(0.83)	(0.83)		(0.30)	(0.30)	(0.30)		(1.53)	(1.51)	(1.51)	
FoodProducers	0.65**	0.68**	0.64**	−0.71**	1.04	1.07	0.93	−3.03***	−0.005	0.25	0.29	−0.05	2.95**	2.94**	2.86**	3.23**
	(0.33)	(0.32)	(0.32)	(0.35)	(0.67)	(0.67)	(0.67)	(0.72)	(0.27)	(0.27)	(0.27)	(0.25)	(1.24)	(1.22)	(1.22)	(1.32)
Retailers	0.49	0.43	0.43	−0.65	0.23	−0.02	0.04	−3.68***	§	§	§	−0.31	0.82	0.27	0.65	1.54
	(0.43)	(0.43)	(0.43)	(0.43)	(0.89)	(0.89)	(0.88)	(0.89)				(0.31)	(1.64)	(1.62)	(1.62)	(1.63)
_cons	−3.87***	−3.60***	−3.70***	−2.50***	−15.60***	−14.70***	−13.62	−10.45***	−5.71***	−6.13***	−6.12***	−5.49***	−1.05	0.31	2.14	−0.70
	(1.02)	(0.98)	(0.96)	(0.98)	(2.10)	(2.04)	(1.97)	(2.04)	(0.27)	(0.71)	(0.68)	(0.71)	(3.87)	(3.71)	(3.60)	(3.76)
R^2	0.6849	0.6835	0.6833	0.6824	0.4096	0.4062	0.4075	0.4137	0.9770	0.9726	0.9724	0.9724	0.3581	0.3653	0.3636	0.3598
Adj.R^2	0.6825	0.6811	0.6808	0.6799	0.4051	0.4017	0.4029	0.4092	0.9768	0.9724	0.9722	0.9722	0.3598	0.3581	0.3644	0.3526
Observations	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440

Note(s): ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$; §: omitted because of collinearity; ⬛: not included in the model

Table 9.
Results highlighted focusing on the environmental dimension of the analysis

IVs & CVs	Model 1E DV: OROA	Model 1F DV: OROA	Model 1G DV: OROA	Model 2E DV: ROE	Model 2F DV: ROE	Model 2G DV: ROE	Model 3E DV: ROS	Model 3F DV: ROS	Model 3G DV: ROS	Model 4E DV: CostOfDebt	Model 4F DV: CostOfDebt	Model 4G DV: CostOfDebt
SocRegulation	1.88***	1.82***	1.73***	4.18***	3.78***	2.01***	1.17***	1.38	0.77**	−3.06*	−1.08	2.73
	(0.59)	(0.35)	(0.49)	(1.20)	(0.73)	(1.00)	(0.41)	(0.25)	(0.34)	(2.15)	(1.31)	(1.82)
WorkforceScore	0.015**			0.04**			0.0**			−0.09***		
	(0.007)			(0.02)			(0.005)			(0.03)		
HumanRightsScore		−0.006			−0.008			0.004			0.01	
		(0.006)			(0.01)			(0.0044)			(0.02)	
CommunityScore			0.02***			0.05***			0.02***			−0.07**
			(0.007)			(0.01)			(0.005)			(0.03)
SocRegulation*WorkforceScore	−0.01*			−0.04*			−0.009			0.09***		
	(0.009)			(0.02)			(0.006)			(0.03)		
SocRegulation*HumanRightsScore		−0.02***			−0.04***			−0.02			0.09***	
		(0.007)			(0.02)			(0.03)			(0.03)	
SocRegulation*CommunityScore			−0.01*			0.005			−0.002			−0.003
			(0.008)			(0.02)			(0.006)			(0.03)
CashFlowsSales	0.21***	0.21***	0.21***	0.18***	0.18***	0.18***	0.88***	0.88***	0.88***	0.07**	0.04**	0.04**
	(0.005)	(0.005)	(0.005)	(0.01)	(0.01)	(0.01)	(0.005)	(0.005)	(0.005)	(0.02)	(0.01)	(0.02)
QuickRatio	−0.40**	−0.48***	−0.29*	−1.22***	−1.21***	−1.14***	0.40***	0.35***	0.51***	0.32	0.28	0.25
	(0.16)	(0.16)	(0.16)	(0.33)	(0.33)	(0.33)	(0.13)	(0.13)	(0.13)	(0.59)	(0.59)	(0.60)
CSRStrategyScore	−0.02***	−0.01**	−0.03***	−0.04***	−0.01	−0.05***	−0.008**	−0.001***	−0.01***	0.04**	−0.008	0.05**
	(0.005)	(0.005)	(0.005)	(0.01)	(0.01)	(0.01)	(0.004)	(0.004)	(0.004)	(0.02)	(0.02)	(0.02)
ManagementScore	0.002	−0.003	−0.003	0.008	0.007	0.0003	−0.008**	−0.008*	−0.001**	−0.03*	−0.03*	−0.02
	(0.005)	(0.005)	(0.005)	(0.01)	(0.01)	(0.01)	(0.003)	(0.003)	(0.003)	(0.02)	(0.02)	(0.02)
lnMV	0.88***	1.01***	0.84***	2.35	2.64***	2.14***	0.55***	0.64***	0.50***	2.28***	1.64***	2.45***
	(0.10)	(0.11)	(0.10)	(0.21)	(0.22)	(0.21)	(0.07)	(0.08)	(0.07)	(0.38)	(0.40)	(0.39)
Beverages	§	§	§	§	§	§	1.60***	1.54***	1.65	§	§	§
							(0.31)	(0.30)	(0.31)			
DrugGroceryStores	0.93**	1.18***	0.92**	3.76***	4.39***	3.67***	0.11	0.16	0.24	0.45	−0.21	0.08
	(0.40)	(0.39)	(0.40)	(0.82)	(0.82)	(0.82)	(0.30)	(0.30)	(0.30)	(1.48)	(1.47)	(1.49)
FoodProducers	0.45	0.61*	0.41	0.86	1.10*	0.71	0.24	0.21	0.29	3.34***	2.87**	3.47***
	(0.32)	(0.32)	(0.32)	(0.66)	(0.67)	(0.66)	(0.27)	(0.27)	(0.27)	(1.19)	(1.19)	(1.21)
Retailers	0.05	0.20	−0.05	−0.25	0.14	−0.78	§	§	§	0.40	0.52	1.00
	(0.43)	(0.42)	(0.43)	(0.88)	(0.88)	(0.88)				(1.58)	(1.57)	(1.61)
_cons	−2.18**	−2.99***	−2.03**	−11.77***	−13.52***	−9.54***	−5.50***	−5.91***	−5.16***	2.81	5.86*	−0.50
	(0.93)	(0.95)	(0.95)	(1.91)	(1.96)	(1.95)	(0.68)	(0.69)	(0.68)	(3.42)	(3.54)	(3.56)
R^2	0.6790	0.6889	0.6775	0.4035	0.4093	0.4049	0.9723	0.9724	0.9725	0.3658	0.3734	0.3646
Adj.R^2	0.6765	0.6865	0.6750	0.40	0.4048	0.4003	0.9721	0.9722	0.9723	0.3586	0.3662	0.3575
Observations	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440

Note(s): ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$; §: omitted because of collinearity; : not included in the model

Table 10.
Results highlighted focusing on the social dimension of the analysis

between sustainability and financial performance. These pieces of evidence contrast with the stream of literature advocating positive moderating effects of the regulation on the relationship between sustainability issues and financial performance (Cupertino *et al.*, 2022a; Oware and Mallikarjunappa, 2022). The AF&B sector has unique features and companies providing equipment, optimization services/eco-innovation (e.g. smart farming solutions) and/or sustainability consultancy are extremely specialised and built strong market entry barriers (e.g. Long *et al.*, 2016). Accordingly, the enactment of legislation on corporate sustainability issues increased the demand for those kinds of services in a market with a low offer. Consequently, the price for eco-innovations, workforce securities, sustainability services and consultancy increased thus lowering the profitability of the AF&B companies.

Mandatory non-financial disclosure produced positive direct effects also on *ROS*. This means that customers positively reacted to the regulation that obliges companies to communicate their social and environmental impacts. This finding is partially in line with those of Goel (2021) that found a positive association between sustainability reporting and *ROS*. Moreover, emissions reduction, workforce welfare practices and good citizenship proved to be business aspects appealing to customers' purchasing choices as to improve *ROS*. Notably, business decarbonisation can reduce carbon taxes and energy use, lowering related costs. Simultaneously, having welfare practices and being a good citizen can affect *ROS* by enhancing productivity and fostering market preferences respectively. Nevertheless, mandatory environmental disclosure partially lowered the positive effect of *Emissionscore* on *ROS*. This means that the legislation, by forcing companies to disclose environmental performance, has induced customers to make purchasing decisions considering the emissions produced by business activities. Therefore, customers tend to penalise companies based on the carbon emissions generated during their production processes.

From a debtholder perspective, the regulation on environmental performance directly increased the *Cost of Debt* while producing little significant moderating effects. This evidence partially contrasts with Garzón- Jiménez and Zorio-Grima (2022) and Raimo *et al.* (2020). In this regard, AF&B companies are induced by the regulation to implement new sustainable-oriented practices and/or processes. This requires investments that AF&B companies can make drawing on external financing. Therefore, an increasing number of companies are pushed to acquire funds through bonds or loans, thus increasing their debt exposure. This, in turn, produces both a higher financing demand and a higher insolvency risk that both induce higher interest rates and thus a higher cost of debt. This evidence is reinforced also by the direct effect that the corporate environmental protection activities had on the *Cost of Debt* increase. As for the moderating effects, we found that mandatory environmental disclosure partially scaled down the *Cost of Debt* increase produced by *ResourceUseScore*. This peculiar effect can be explained as follows. The legislation induced companies to disclose their resource use practices. This breaks down part of the information asymmetries between companies and banks. The latter, becoming aware of how resource uses are optimised through the capital provided on loan, calm down their risk evaluations lowering interests. In other words, the credit institutions evaluate the interest rate not only based on firms' financial situation but also considering the companies' sustainable resource use practices. Mandatory non-financial disclosure thus extended companies' credit assessment including environmental criteria as well.

Our results are in contrast with prior studies (e.g. Fonseka *et al.*, 2019) which found that mandatory environmental disclosure reduces the *Cost of Debt*. Our findings also expand those of Cupertino *et al.* (2022a) that found no evidence about the relationship between mandatory non-financial disclosure and the *Cost of Debt*. From the social perspective, the regulation on social disclosure directly causes a reduction of the *Cost of Debt*. Accordingly, reducing the information asymmetries about the respect of human rights, employees' working conditions and the impact on the community mitigates any risks inherent in reputation and/or illegal

practices (Nirino *et al.*, 2022a). Nevertheless, the moderation effect of mandatory social disclosure partially downsizes the *Cost of Debt* reduction induced by the *WorkforceScore*. This effect could be justified by the following assumptions. The sustainability reporting regulation obliges companies to disclose some shadow welfare aspects (such as weakness in gender diversity or inclusion practices, job insecurity, low wages, high risk of accidents, etc.) that could increase the *Cost of Debt*. Alternatively, the compliance with stringent normative sustainability reporting requirements induces companies to borrow capital to invest in human resources management activities. This attitude could increase the financing demand and the *Cost of Debt* for companies.

On the background of the proposed research questions, this paper has demonstrated what direct and indirect effects mandatory non-financial disclosure has on the different dimensions of AF&B companies' performance. Unlike previous studies, this paper has adopted a multidimensional perspective by breaking down financial and non-financial performance into a plurality of sub-components. This approach allowed the authors to show in detail which non-financial elements impact the different dimensions of financial performance. Furthermore, dividing among social and environmental disclosure, the authors manage to find original pieces of evidence on the different effects they have on companies' performance. Moreover, the global nature of the analysis makes more generalizable the results found thus expanding the knowledge on the investigated phenomenon. The multiple measures of financial performance, instead, allowed to appreciate how different stakeholders (namely owners, managers, debtholders and customers) reacted to mandatory non-financial disclosure. Finally, our results show that non-financial disclosure does not respond only to normativity, stakeholder and corporate legitimization logics (e.g. Chauvey *et al.*, 2015; Cho and Patten, 2007; Thorne *et al.*, 2014) but can be an effective profitability driver (e.g. Buallay, 2020; Singh and Chakraborty, 2021). Consequently, companies should consider ESG practices as a mean to increase competitiveness over those competitors who are less inclined to consider sustainability issues (Porter and Kramer, 2011). However, for this to happen, managers must be able to contain the negative side effects that mandatory non-financial disclosure can generate. In this regard, companies should rationalize management costs, increase the contribution margins or create retained earnings to compensate for the extra costs caused by legislation and/or by any inflationary phenomena that arise therefrom.

6. Conclusion

Despite the great institutional and legal pressures on corporate sustainability practices, the literature presents still scarce and conflicting evidence about the role of mandatory non-financial disclosure in affecting business financial and non-financial performance. In the light of this, the present paper aimed at investigating the direct effect of worldwide mandatory non-financial disclosure on several dimensions of financial performance as well as its moderating effects on the relationship between sustainability and financial performance. Being aware that the results of such a study can be strongly sector specific (Buallay, 2020; Tuppura *et al.*, 2016), we focused on the AF&B sector due to its peculiar attitude to strongly affects and be affected by sustainability issues. We found that mandatory non-financial disclosure can affect several dimensions of financial performance differently. We showed a general and positive direct effect of mandatory non-financial disclosure on operating profitability, shareholders' returns and returns on sales thus reinforcing and extending Buallay (2022b) and Goel (2021) findings. Nevertheless, the regulation on non-financial disclosure negatively moderates the relationship between sustainability issues and *OROA*, *ROE* and *ROS*. This can cause side effects (e.g. the expansion of the demand for sustainability services with a consequent price increase and/or reduced customers' willingness to purchase due to carbon emissions disclosed) that can indirectly harm the AF&B companies'

profitability. From a debtholder perspective, we found that mandatory environmental disclosure could push companies to invest more in eco-friendly business practices by accessing borrowed funds and increasing the *Cost of Debt*. Conversely, our findings showed that mandatory social reporting could reduce the interest rate since enhancing corporate transparency on social issues could improve firms' reputation and access to credit.

This paper contributes to the current literature in several ways. Initially, it found innovative pieces of evidence on the direct effect of mandatory non-financial disclosure on financial performance on a global scale. To the best of our knowledge, we are among the first in adopting such a broad perspective in investigating this phenomenon and focusing on the AF&B industry. Furthermore, we extended the results of Cupertino *et al.* (2022a) and Oware and Mallikarjunappa (2022) regarding the effects of mandatory non-financial disclosure. On one hand, we expanded the investigation perspective moving from a single geographical context to a global one. On the other hand, we managed to find some significant associations between mandatory non-financial disclosure and the *Cost of Debt*. Moreover, we are among the first in considering the customer perspective, using *ROS* as a financial proxy in the analysis of the relationship between mandatory non-financial disclosure and firms' profitability.

Finally, we are among the earliest that analysed the direct and moderating impacts of mandatory non-financial reporting on financial performance distinguishing between social and environmental disclosure regulations.

From a practical standpoint, this study can support managers to find optimal trade-offs that allow companies to ensure management efficiency considering the direct positive/negative effects of both regulatory compliance and non-financial performance. Moreover, our findings could be useful for the sustainability reports preparers suggesting which are the ESG elements that are more financially relevant and that should be stressed the most in the non-financial disclosure (e.g. eco innovation, GHG emissions, product responsibility and the initiatives aimed at producing benefits for the community).

As for the indirect effects of mandatory non-financial disclosure, policymakers should mitigate the possible normative side effects that can harm companies' financial performances and boost non-financial/financial performances synergies. Notably, the enactment of appropriate policy mechanisms should prevent possible controversial issues such as greenwashing, inflation of ESG activities prices or introducing subsidies as well as tax reliefs for companies that invest in sustainability practices. For their part, managers can cope with the normative side effects by increasing liquid assets to be used as "cushions" to amortize any costs induced by sustainability issues.

This study has some limitations. At first, since we opted for a strongly balanced data panel, the sample size is not particularly large. Secondly, the analysis investigates only the short-term effects of non-financial issues on financial performance. Thirdly, the analysis mainly considered internal business features and processes. Accordingly, future studies can extend our findings by enlarging the sample and/or focusing on the long-term effects of corporate sustainability disclosure/practices on financial performance. Further study can also expand the analysis considering external aspects such as socio-cultural indicators, customer satisfaction and corporate reputation.

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