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Risk Disclosures and Non-Financial Reporting: Evidence in a New European Context

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Abstract: The objective of this research is to determine the extent and current characteristics of risk disclosure in Europe in the context of corporate non-financial reporting practices. A multivariate linear regression analysis on risk disclosure behaviour is performed on a sample of companies included in the EURO STOXX 50 Index, whose data were collected from their annual financial reports. Additionally, a first longitudinal exploration is carried out with respect to the GRI standard. It was possible to detect which risk items are more frequently reported by the selected corporations, and which corporate documents are most likely to contain relevant risk information. It was also possible to establish a link between specific industries, countries and company financial profiles and levels of risk disclosure. This empirical research is particularly relevant in the current scenario where several events converge: the gradual evolution, since 2017, of the NFRD (Non-Financial Reporting Directive) to a new Corporate Sustainability Reporting Directive (CSRD); the subsequent legal requirements for 2020 and 2021 of the ESEF (European Single Electronic Format) to support the disclosure of annual corporate reports; the pandemic and the new war scenario in Europe. This empirical work provides novel insights into risk disclosure and non-financial information in a particular setting, i.e., pre- and post-pandemic Europe, against a backdrop of growing concern about a new war scenario.

Keywords: risk disclosure; non-financial reports; European Single Electronic Format; Global Reporting Initiative.

JEL classification: D82; G32; M48.

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1. INTRODUCTION

While internal risk management is undoubtedly a key factor for business success in turbulent times, it is also important for companies to ensure an adequate and balanced information on its management to the different interest groups, provided that this does not jeopardize their competitive position. Risk disclosures are then perceived as an essential element in corporate communication with investors, as well as with other agents, allowing them to make better informed decisions. In this sense, symbolic legitimation strategies are predominant to modify the perception by stakeholders (Hahn & Lülfs, 2014), but the problem of providing adequate information for different users remains. Therefore, the very nature of the information to be transmitted to the public audience poses a complex challenge, since the nature of each company is different, even within the same sector. The imperative for accurate predictions of the future extends to both business and public management, yet the reliability of our ability to foresee future events is increasingly under scrutiny. Economic modeling, a complex undertaking in itself, becomes even more formidable when it comes to forecasting, particularly in the unpredictable realm of recessions (Loungani, 2001). The lingering impact of an unparalleled global pandemic, marked by both a high mortality rate and colossal containment efforts, continues to reverberate. Corporate supply chains grapple with persistent disruptions, and restrictive measures persist, casting a shadow on the economic landscape (Xu *et al.*, 2020). As the world strives to recover, the emergence of a new war scenario in Ukraine introduces turbulence into energy markets, cereals, and other food supplies, with implications extending to future interest rates and, crucially, challenging price levels for heavily indebted citizens, governments, and companies (Khudaykulova *et al.*, 2022). A comprehensive forecast of the future must encompass both positive aspects, such as growth opportunities for companies, and potential negatives that, if materialized, could result in a loss of value for firms, necessitating consideration of various scenarios. Most forecast models rely on expert judgments as qualitative methods or historical sales and related quantitative variables (Chase Jr, 1997). The demand for real-time information in this context is increasingly pivotal, prompting the emergence of novel approaches and tools, although numerous challenges persist (Ferrara & Sheng, 2022). Indeed, the efforts to determine the probability and impact of potential losses would be futile without accompanied preventive measures or, if deemed inevitable, mitigation strategies. This motivation has propelled the development of studies on business risks across various industries, with sectors such as banking and insurance leading the charge in employing sophisticated methods (e.g., Elshandidy *et al.*, 2018; Tahat *et al.*, 2019). Consequently, the reflection of risk management is evident not only in business practices but also in the evolution of regulations, with the financial sector, exemplified by the Bank for International Settlements of Basel (BIS, 2022), serving as an illustrative example.

In the European context, business information has undergone an unprecedented transformation in recent years, driven by the growing importance of non-financial information within the regulatory framework, as well as by the new mandatory digital formats in which annual reports must be prepared. Risk reporting is also under the spotlight because of the pandemic and climate emergency influence, as highlighted by the most recent literature (e.g., Abhayawansa & Adams, 2021; Crovini *et al.*, 2022; Roberts *et al.*, 2023). Given this context, the aim of this research is to analyse the extent and main behavioural characteristics of corporate risk disclosures related to non-financial reporting practices across Europe. This empirical research is particularly relevant in the current landscape of post-pandemic dynamics, and with the legal requirements for 2020 and 2021 of the ESEF (European Single Electronic Format) (ESMA, 2020; XBRL, 2021) to support the release of annual corporate reports in electronic format, in conjunction with the new scenario of war in Europe. The concurrence of all these factors, indeed, makes an in-depth review of risk disclosure practices by the main companies in the continent very relevant. Therefore, this exploratory study focuses on the period immediately prior to the entry into force of the ESEF framework. Additionally, a first longitudinal exploration is carried out with respect to the GRI (Global Reporting Initiative) standard, with the aim of providing preliminary evidence that allows future longitudinal studies. This study extends the extant literature on the extent and determinants of risk disclosure within non-financial reporting practices, including sustainability reporting and integrated reporting e.g., Guthrie *et al.* (2020). Specifically, this research represents a contribution, urging companies, standard setters, and regulators in the realm of non-financial information and sustainability to channel their endeavours towards enhancing non-financial statements as the premier conduit for advancing corporate risk information. The critical significance of this emphasis lies in its potential to augment the transparency, reliability, and relevance of risk-related disclosures. By focusing on non-financial statements, a comprehensive understanding of the intricacies of corporate risk can be conveyed, offering stakeholders a robust framework to assess and navigate the complexities of modern business environments. Furthermore, our findings transcend the immediate scope of corporate practices, extending valuable insights that cater to the nuanced information requirements of policymakers and investors. In the evolving landscape of European post-crisis financial markets, the emphasis on bolstering non-financial statements as a primary repository for risk information assumes paramount importance. As Europe undergoes significant transformations, from the progressive evolution of the Non-Financial Reporting Directive (NFRD) to the enactment of the new Corporate Sustainability Reporting Directive (CSRD), our research serves as a timely compass. It guides stakeholders in aligning their strategies with the evolving regulatory landscape, facilitating informed decision-making in an era marked by unprecedented challenges, including the ongoing global pandemic and the geopolitical uncertainties, such as the emergence of a new war scenario in Europe.

In relation to the structure of this article, we firstly overview the theoretical context of the concept of risk and the current frameworks that address risk disclosure, both those legally established and those of voluntary use (Section 2). Subsequently, after the hypotheses development, the sample and the statistical methodology used are introduced (Section 3). Finally, our article addresses the discussion of the results obtained (Section 4) and provides some final conclusions (Section 5).

2. REGULATORY CONTEXT AND THEORETICAL BACKGROUND

Companies need to disclose information about their activities and the results thereof. The academic literature has addressed this problem from various perspectives, addressing agency theory as one of the main theoretical frameworks (Mokhtar, 2017). In later times, the need for the focus of the corporate report to go beyond the shareholding was glimpsed. It is from this perspective that approaches such as the stakeholder theory emerged (Freeman *et al.*, 2010). Within the corporate report, which has multiple edges and dimensions, the information published regarding the risks of diverse natures faced by companies deserves special attention due to its development in recent years. Risk is a key variable in both business management and macro-policymaking, even though it is not adequately defined in many contexts (Moeller, 2011). The term risk, etymologically related to riscum in Latin, evolved into English from nautical activity through its use in insurance at an early stage, and is usually considered a synonym for uncertainty, inherent to any business, accompanied by its corresponding potential effects (normally if it is negative for the company) and its probability of occurrence (Merna & Al-Thani, 2008). Indeed, as detailed by Ibrahim and Hussainey (2019), risk is almost unanimously defined in negative terms, of possible loss. As in other areas of company management, disclosure is often seen as a potential benefit to the reporting company, as it strengthens its relationship with key stakeholders. Therefore, various authors have explored the links between risk disclosures and firm value or market reaction, but there is no general consensus on the usefulness and impact of risk disclosures. For example, Heinle and Smith (2017) demonstrate that risk disclosure decreases the firm's cost of capital, whereas Beatty *et al.* (2019) detect a decreasing impact of this type of disclosure in several markets in the post financial crisis period. It seems clear that the right risk management strategy vary depending on the specific nature of that risk.

However, empirical research is not easily comparable if various reporting and regulatory frameworks coexist, which often provide a set of key performance indicators that allow companies to detail their performance on each key dimension, financial and non-financial (environmental, and corporate governance) with the corresponding detail of the related risks. Some risk management frameworks have been developed for specific sectors, whereas other frameworks have a more general scope both in the financial and non-financial areas of corporate reporting, as detailed in the following subsection.

2.1 Competitive or complementary risk frameworks

There are several corporate risk frameworks that coexist and interact, including also various sources of risk indicators that arise from financial and non-financial standards. It is not uncommon for companies to refer to more than one of these international references as guidance they follow in their corresponding risk management systems and related disclosures. Without claiming to be exhaustive, it is possible to highlight some of the most notable.

As initiatives of special relevance, we have those already mentioned in the financial field developed by the Basel Committee on Banking Supervision, in relation to risks and their coverage, in what is known as the Basel III (BIS, 2022). On the other hand, we also consider the Solvency II Directive, whose purpose is the codification and harmonization of the insurance sector, and which consists of three pillars with quantitative, governance and management requirements, as well as disclosure and transparency (EIOPA, 2022). Not so industry specific, the COSO (2022), is a leading framework worldwide. Operating since 1992 with the support of the North American accounting community, the COSO organization is highly popular as a benchmark for publicly traded companies in various industries. The current model, established in 2017, presents a significant evolution from the previous model issued in 2004, which is now based on five interrelated components: governance and culture; strategy and goal setting; performance; review and monitoring; and finally, information, communication and reporting. Some of the indicators present in this reference framework have to do with whether the company refers, in its disclosures, to environmental and social risks, being the relationship between risk and non-financial information very relevant.

In addition to the various specific risk management frameworks, it should be noted that financial reporting frameworks have also made significant progress in mandatory disclosure of certain risks. Specifically, the IFRSs (International Financial Reporting Standards), more specifically IFRS 7, refer to the financial risks associated with financial instruments. Both the IFRS 9 and IAS 32 also have particularities and specific elements related to risk coverage, and other IFRSs also refer to associated financial risks: for example, ordinary rental contracts (IFRS 15), lease contracts (IFRS 16), insurance contracts (IFRS 17) and by extension, in general, practically all IFRSs (IFRS, 2022) (IFRS, 2022). In relation to non-financial risks, the literature is limited to mentioning their appearance in reports and statements based on IFRS. In a similar vein to the IFRS, we could consider the American standards, USGAAP, which also focus on financial risks and require certain disclosures (Tahat *et al.*, 2019).

Non-financial or sustainability standards and guidelines also provide relevant risk metrics and strategies. A powerful reference framework is provided by the Global Reporting Initiative (GRI) standards. These standards are provided free of charge as a public good and, as the organization itself details, since its launch in 1997 they have undergone successive modifications, including their alignment with the United Nations Sustainable Development Goals between 2015 and 2017 (GRI, 2022). It is also interesting to extract some of the risk-related requirements from this framework; for example, whether the ultimate responsibility of the company in these matters is correctly identified or whether the company monitors and responds to corruption. However, some scholars refer to GRI disclosure to warn on possible legitimisation strategies companies use to report "negative aspects", as well as the operationalisation of transparency as a "self-regulation" instrumental tool (Hahn & Lülfs, 2014; Vigneau & Adams, 2023). Such issues reaffirm the importance of regulation in defining mandatory sustainability reporting requirements and non-financial assurance practices to cover adherence to reporting principles and processes. The European Financial Reporting Advisory Group (EFRAG) and the Global Reporting Initiative (GRI) have announced that their respective standards are interoperable. This means that companies can use GRI to comply with the requirements of the European Sustainability Reporting Standards (ESRS). This is a significant step forward in promoting the adoption of GRI standards by European companies (EFRAG, 2023).

2.2 Legal landscape: the Non-Financial Information Directive and the European Single Electronic Format towards the new Corporate Sustainability Reporting Directive

In recent decades, business regulation has been based on the crystallization of previous successful practices of leading companies, particularly in terms of transparency. This has caused the debate on the advisability of such standards to remain open, as well as a strong mutual influence between the voluntary disclosure frameworks and the new regulation, which evolve in parallel. Kravet and Muslu (2013) consider, in light of their empirical results, that certain regulations on the mandatory disclosure of risks could increase the volatility of the profitability of companies' shares. Dumay and Hossain (2019) reflect on the adequacy of a voluntary disclosure framework against regulation and, in a study of Australian companies, come to no conclusive results that regulation can significantly change the level of voluntary risk disclosure that already exists. For all these reasons, the promulgation of a new regulation on mandatory reporting is treated with great caution by all the agents involved.

As discussed above, the corpus of mandatory corporate disclosures is structured into a set of rules and standards that encompasses both financial and non-financial dimensions. Regarding the latter, in the European Union, the Non-Financial Information Directive (Directive 2014/95/UE) is the key instrument to try to standardize pre-existing sustainability disclosure practices (European Commission, 2020). This rule requires companies to prepare a non-financial report as part of (or referenced from) the management report that accompanies the financial statements of the main listed companies selected as being of public interest (a total of more than 11,000 companies and groups). This opens the door to the upcoming Corporate Sustainability Reporting Directive (CSRD) and related EU Sustainability Reporting Standards (ESRS).

Again, in the context of the EU, another key legal novelty emerges, together with the strengthening of the role of ESMA (European Securities and Markets Authority), in terms of the content and format of annual reports at consolidated level. The format in which corporate reports in general, and risk disclosures in particular, are delivered, continue to pose a challenge in terms of extracting relevant information effectively, as reflected, for example, in the efforts of Wei *et al.* (2019). Indeed, the ESEF (ESMA, 2020; XBRL, 2021) represents a technical evolution of the classic annual financial reports in PDF to a new XHTML (eXtensible HyperText Markup Language) file that humans can read with any web browser and that can also be accessed by different applications that automatically extract relevant information, due to electronic tags the XBRL (eXtensible Business Reporting Language) tags - contained in the document itself. The gradual standardization of annual financial reports, hand in hand with the gradual application of this technology from 2020, could contribute to greater clarity and conciseness in corporate information, as has already happened in other business environments where it has been applied.

In summary, a new scenario is taking shape in the field of corporate transparency, inspired by internationally accepted guidelines. This results in a growing presence and emphasis on non-financial aspects, as well as an increasingly ambitious and sophisticated European regulation, which structures new digital content and formats for the annual financial report, in which context is the disclosure of risks. Such changing environment justifies the need to collect detailed empirical evidence from these transition years.

2.3 Research hypotheses

A significant number of authors have analysed the role of information on market value, as summarized by Mora Rodríguez *et al.* (2021). As in other areas of corporate disclosure, it is relevant to explore what explanatory factors might justify different levels of transparency, and in particular in relation to risk-related disclosures. There is a significant number of contributions that link disclosure levels to company dimensions, such as company size, country, and some financial variables, such as leverage, profitability, or investment intensity (Grassa *et al.*, 2021). This led us to the following hypotheses development.

Hernández-Madrigal *et al.* (2012) study a sample of Spanish companies and detect how risk information, although mostly qualitative, is evolving towards a greater presence of quantitative indicators. In this regard, it is interesting to explore whether the risk management framework influences the format used for the different risk elements. Hodder *et al.* (2001) had already considered that the lack of quantitative information could lead to an incorrect assessment of the risks by the users of the disclosed information. Dobler (2008) delves into the examination of certain regulatory frameworks to ascertain whether they serve as positive or negative influences on incentives for risk reporting within companies. The study sheds light on the nuanced dynamics, exploring the potential dual nature of regulatory impact. It is therefore possible to question which frameworks can promote the gradual offer of risk information to a greater extent, and in particular, in quantitative terms. This allows formulating the following hypothesis:

***H1**: The intensity of risk information and key attributes therein are significantly shaped and propelled by the framework dictating the formulation of these reports.*

Guthrie *et al.* (2020) show how a group of Italian companies use their integrated reports to disclose a multitude of risk data, particularly those related to the environmental and social spheres. Other authors like Fijałkowska and Hadro (2022) explore the presence of risk disclosure at non-financial reports, with different balances between environmental and social topics. Szczepankiewicz *et al.* (2022) suggest developing a single integrated European Union (EU) regulation (e.g., directives, standards, or official principles) for non-financial risk disclosures. Therefore, it is relevant to investigate the link that may exist between risk information and the new sustainability reports that companies are disclosing. Additionally, a first longitudinal exploratory study is carried out, for which the disclosure of risks under the GRI framework is examined in fiscal year 2021, once the new reporting standards described have been established in a mandatory manner, so that it is a substantially different framework of reference. Therefore, the following hypothesis is formulated:

***H2**: The volume and crucial features of risk disclosures are significantly intertwined with the extent of non-financial information disclosure by a company, indicating a profound shift in the factors steering risk disclosure within the contemporary European reporting framework.*

Elzahar and Hussainey (2012) found a positive relationship between size and the level of narrative risk disclosure in a sample of UK companies. Linsley and Shrives (2006) also found a positive relationship between UK company size and risk disclosure, as well as a link between risk disclosure and the level of environmental risk. On the other hand, companies in the most environmentally sensitive industries are more likely to disclose verifiable environmental information and its assurance, as they are under social pressure due to unique constraints and collateral potential damage to public health (Elzahar & Hussainey, 2012; Braam *et al.*, 2016; Flores-Muñoz *et al.*, 2018). Additionally, companies with a worse financial result tend to have less readable, longer and less readable reports and a more optimistic tone (Melloni *et al.*, 2017). This is also connected to the relationship between the disclosure of non-financial information and the accuracy of analysts' forecasts at the country level, such that the issuance of independent CSR reports is associated with a lower forecast by analysts, being a stronger relationship in those countries that are more stakeholder oriented and therefore the performance of non-financial information affects the financial result of the company (Dhaliwal *et al.*, 2012). Therefore, we can formulate the following hypothesis:

***H3:** The magnitude and essential traits of risk disclosures are intricately linked to the dimensions, industry dynamics, financial standing, and geographical location of the reporting company, signifying a dynamic interplay that significantly shapes the landscape of risk disclosure.*

3. SAMPLE AND METHODS

We explored the sample of firms composing the EURO STOXX 50 (Stoxx, 2022). This index is made up of 50 companies from 8 Eurozone countries: Belgium, Finland, France, Germany, Ireland, Italy, the Netherlands and Spain. The years 2019, 2020, and 2021 hold particular significance for this study due to the evolving regulatory landscape in Europe. This period witnesses a pivotal shift from the Non-Financial Reporting Directive (NFRD) to the Corporate Sustainability Reporting Directive (CSRD), marking a critical milestone. Simultaneously, key legal requirements, such as the European Single Electronic Format (ESEF), have been introduced to support the disclosure of annual corporate reports. These regulatory changes provide a dynamic and pertinent backdrop for the research, as companies navigate and respond to new reporting frameworks and mandates. To make longitudinal analysis possible between the 2019 and 2021 data, seven companies were excluded from the sample. Data was collected from corporate websites, annual financial reports and related consolidated annual filings. The data have been processed by two independent experts who later compared their results to avoid bias. In particular, we explored the notes to the financial statements, management reports and (within or referenced from them), non-financial reports. For each company, country, industry and financial variables, financial figures for the year ending in 2019 were also collected, so they were not affected by the pandemic phenomenon. Dichotomous variables were prepared to collect the behaviour of the company in each case, as summarized in Table no. 1.

Table no. 1 – Risk disclosure variables and explanatory factors. All dichotomous variables

Non-financial report	Does the group present non-financial statements?		Y_nfd
	Is the non-financial report found as part of the management report?		Y_nfd_managreport
Risk disclosures	Does the group declare that it is supported by a specific international framework?		Y_riskframework
	International framework of reference		y_coso y_gri
	Where are these risk disclosures located?	Notes to the financial statements	y_risk_in_notes
		Management report	y_risk_in_managreport
		Non-financial report	y_risk_in_nfd
Materiality matrix	Does the group present a materiality matrix?		Y_materialitymatrix
Financial statement data (€ million)	Statement of income	Income	f_revenue
		Net income before taxes	f_netincomebefore
		Net profit after taxes	f_netincomeafter
		Interest	f_interest
	Balance sheet	Total assets	f_totalassets
		Full equity	f_totalequity
	Cash flow	Cash from operating activities	f_ocf
		Cash from investing activities	f_icf
Risk frameworks	COSO risk transparency index	Do they refer to esg risks (environmental, social and/or corporate governance)?	Y_coso1
		Is the information on esg from the sustainability report quantified in the annual report?	Y_coso2
		Has the company organized a group of sustainability experts?	Y_coso3
		Do you apply preventive risk mitigation?	Y_coso4

	Does the detection of existing risks apply?	Y_coso5
	Is there a form on internal control deficiencies?	Y_coso6
	Does the group use ict to communicate risk information to different users of information?	Y_coso7
GRI risk transparency index	Does the group apply the precautionary principle to risk management in the planning of operations in development or launching of new products?	Y_gri1
	Does the group estimate that the existing risks may affect its long-term forecasts?	Y_gri2
	Does the group anticipate the appearance of new risks as a consequence of compliance with sustainability?	Y_gri3
	Are esg risks clearly identified and cataloged according to the corresponding group?	Y_gri4
	Have the functions of the highest government body been identified with regard to risk management?	Y_gri5
	Does the group specifically consider corruption as a specific risk?	Y_gri6
	If the above question is yes, do you apply any type of measure to combat it?	Y_gri7
	Does the group have legal actions pending or carried out during the period in respect of unfair competition and/or monopolistic practices or against free competition?	Y_gri8
	Has the group detected operations or suppliers with cases of forced labor or child exploitation?	Y_gri9

For the two risk frameworks that were explored in detail, both primary dichotomous variables were used along with composite transparency indices, i.e.: (1) the index related to COSO disclosures, as an average of the 7 elements considered, and (2) the index related to GRI-inspired disclosures, again the simple average of the 9 components.

$$yy\_coso = \frac{\sum_{i=1}^{7} y\_coso_i}{7} \quad (1)$$

$$yy\_gri = \frac{\sum_{i=1}^{9} y\_gri_i}{9} \quad (2)$$

Descriptive statistics of such indices and the explanatory variables were calculated to test the first two hypotheses on the characteristics of risk disclosure. In order to test the third research hypothesis on the determinants of risk disclosure, an econometric analysis was carried out based on the following linear regression model:

$$y_i = \beta_0 + \beta_j x_{1j} + \beta_k x_{2k} + \beta_l fin_l + \varepsilon_i \quad (3)$$

where y_i are the various variables referring to risk disclosure and its main characteristics, x_{1j} and x_{2j} are, respectively, the sectors and countries to which each of the companies belong, and finally fin_l are the various financial variables of each firm, being ε_i the standard error, normal, homoscedastic and not autocorrelated.

4. RESULTS AND DISCUSSION

Table no. 2 provides descriptive statistics for non-financial statement disclosure. Spanish, Dutch, and Italian companies emerge as leaders in this variable. Notably, specific sectors such as energy, financial, and telecommunications exhibit prominence, affirming that certain industries are subject to distinct constraints within their business environments (Elzahar & Hussainey, 2012). Another notable aspect is that, of the 48% of companies providing non-financial statements, a significant majority have the non-financial statement as an integral part of the core of the management report. However, the regulations allow a second option: that the non-financial statement is simply referenced in the management report and treated as a separate report. This type of practice highlights the importance of non-financial information in the context of regulated information.

Table no. 2 – Descriptive statistics related to non-financial information

Descriptive statistics for Y_NFD Categorized by values of X2__COUNTRY	
X2__COUNTRY	**Average**
Spain	1,000000
Italy	0.666667
Netherlands	0.750000

Descriptive statistics for Y_NFD Categorized by X1__INDUSTRY values	
X1__INDUSTRY	**Average**
Energy	1,000000
Financial Services	1,000000
Telecommunications	1,000000
Utilities	0.500000
All	0.488372

	Y_NFD
Mean	0.488372
Median	0.000000
Maximum	1.000000
Minimum	0.000000
Std. Dev.	0.505781

When discerning the pertinent elements of the annual report, extending beyond the regulatory minimum requirements, approximately 39% of companies employ diverse methods of engaging with stakeholders. These approaches include the utilization of materiality matrices, offering a concise framework for emphasizing specific aspects and risks deemed most significant. Table no. 3 shows how Spanish, Irish and Italian companies use this instrument most frequently. In the distribution by sectors, energy and banks companies are the most advanced in this regard.

Table no. 3 – Descriptive statistics related to the use of materiality matrices

Descriptive statistics for Y_MATERIALITYMATRIX Categorized by values of X2__COUNTRY	
X2__COUNTRY	**Average**
Spain	1,000000
Ireland	1,000000
Italy	1,000000

Descriptive statistics for Y_MATERIALITYMATRIX Categorized by X1__INDUSTRY values	
X1__INDUSTRY	**Average**
Banks	0.600000
Energy	1,000000
All	0.395349

	Y_MATERIALITYMATRIX
Mean	0.395349
Median	0.000000
Maximum	1.000000
Minimum	0.000000
Std. Dev.	0.494712

Regarding risk information, a key aspect of those raised above is whether that information complies with any of the international reference frameworks, such as the COSO or the GRI. 83% of the firms adhere to one or two of these frameworks, specifically, 48% invoke COSO and 77% GRI, with a clear intersection that affects a third of the sample.

Understanding the section of the annual report where risk information is consolidated is crucial. The notes to the financial statements and the management report emerge as the sections most likely to contain risk information, surpassing 80%. Additionally, over 35% of groups commence reporting risks in their non-financial reports, aligning with earlier findings that indicated connections between these two forms of disclosures (Fijałkowska & Hadro, 2022). Consequently, these regulated reporting components are gaining significance in the realm of risk analysis, as highlighted in Table no. 4.

Table no. 4 – Sections of the annual report where the risk disclosures are found

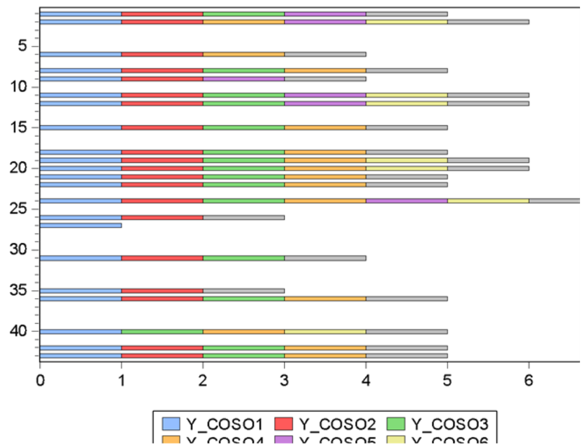
	Y_RISK_IN_NOTES	Y_RISK_IN_MANAGREPORT	Y_RISK_IN_NFD
Mean	0.883721	0.813953	0.357143
Median	1.000000	1.000000	0.000000
Maximum	1.000000	1.000000	1.000000
Minimum	0.000000	0.000000	0.000000
Std. Dev.	0.324353	0.393750	0.484966

4.1 Risk items disclosed and determinants related to the COSO framework

Given the importance of the two frameworks studied, the COSO and the GRI, it is necessary to explore which risks are detailed, among those suggested by those guides. Starting with the COSO, the most frequent aspect refers to items number 1 and 7, respectively related to the two main aspects of concern in this study: the risks related to the ESG issues and the use of ICT for dissemination (Table no. 5).

Table no. 5 – Risk disclosures related to COSO

	Y_COSO1	Y_COSO2	Y_COSO3	Y_COSO4	Y_COSO5	Y_COSO6	Y_COSO7
Average	0.511628	0.465116	0.372093	0.325581	0.139535	0.162791	0.488372



The transparency index related to the COSO metrics, called *yy__coso*, shows a certain positive relationship, on the one hand, with the utilities sector, and on the other hand, with some of the financial variables considered, such as the cost of debt or debt intensity, along with investment intensity (Table no. 6).

Table no. 6 – Risk disclosures related to COSO, with some explanatory factors

Dependent variable: YY__COSO
Method: Least squares

Variable	Coefficient	Standard _ Error	t-statistic	p-value
F_COSTOFDEBT [a]	23.56909	5.617053	4.195988	0.0001
F_INVESTIRFORT [b]	0.224769	0.077084	2.915912	0.0058
R-squared	0.108300			

Dependent variable: YY__COSO
Method: Least squares

Variable	Coefficient	Standard _ Error	t-statistic	p-value
C	0.324042	0.055152	5.875391	0.0000
X1_UTIL	0.604530	0.255731	2.363927	0.0229
R-squared	0.119948			

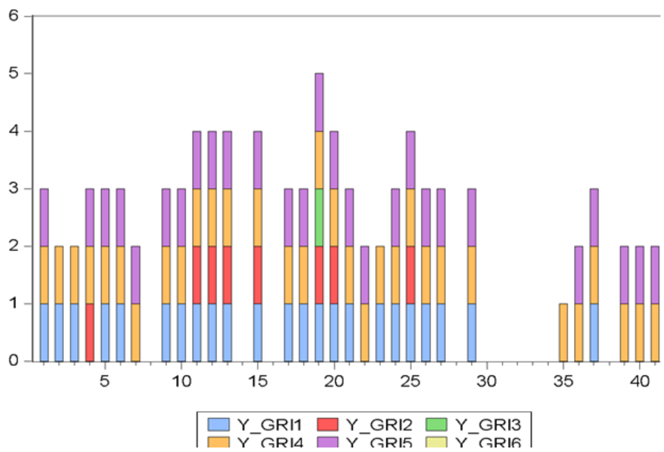
Notes: [a] F_COSTOFDEBT= f_interest/ (f_totalassets – f_totalequity); [b] F_INVESTIRFORT= f_icf/f_ocf

4.2 Risk items and determinants related to the GRI framework

Table no. 7 shows the reported risk items among those selected from the GRI framework. The most frequent disclosures are those related to items number 4 and 5, respectively: interestingly, such result is somewhat in accordance with what was found regarding the COSO framework disclosures, i.e., the prominence of ESG metrics and the issues related to corporate governance and its responsibility in risk management.

Table no. 7 – Contents of risks related to GRI

	Y_GRI1	Y_GRI2	Y_GRI3	Y_GRI4	Y_GRI5
Average	0.558140	0.209302	0.023256	0.767442	0.674419
	Y_GRI6	**Y_GRI7**	**Y_GRI8**	**Y_GRI9**	
Average	0.000000	0.000000	0.023256	0.000000	



The transparency index related to the GRI metrics, called yy__gri, also shows a certain positive relationship with specific industries – such as the automobile production, financial services and industrial goods and services – along with certain financial profiles, such as those companies with the highest cash flow from investing activities and cost of debt (Table no. 8).

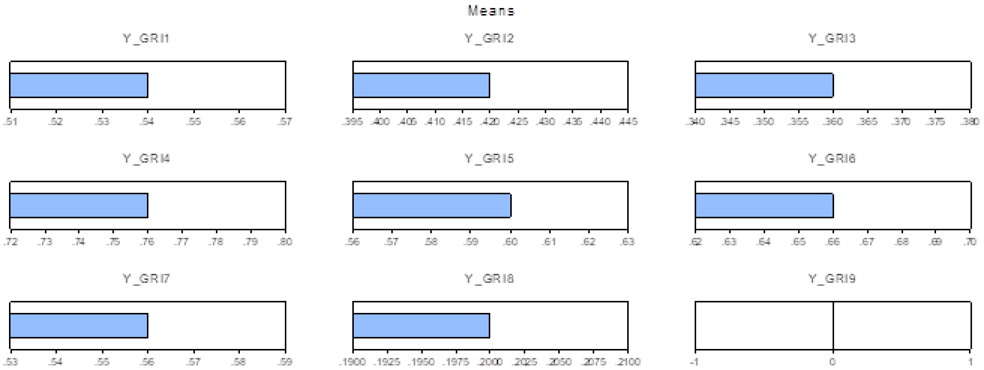
Table no. 8 – Contents of risks related to GRI, with some explanatory factors

Dependent variable: YY__GRI				
Method: Least squares				
Variable	**Coefficient**	**Standard _ Error**	**t-statistic**	**p-value**
F_ICF	1.37E-05	3.81E-06	3.592717	0.0009
F_COSTOFDEBT	15.36055	2.265564	6.780013	0.0000
X1_AUTO [a]	0.302281	0.118200	2.557361	0.0147
X1_FIN [b]	0.317472	0.148703	2.134945	0.0393
X1_IND [c]	0.166855	0.061852	2.697673	0.0104
R-squared	0.277581			

Notes: [a] X1_AUTO=automobiles and parts; [b] X1_ FIN=financial services; [c] X1_IND=industrial goods and services.

In order to initiate a first longitudinal analysis, which will be the object of work in a subsequent study, Table no. 9 contains some data regarding the disclosure of risks under the GRI framework in the financial year 2021, when the GRI is already implemented along with the ESEF standard.

Table no. 9 – Longitudinal exploration of risks under the GRI framework in a subsequent period



	Y_GRI1	Y_GRI2	Y_GRI3	Y_GRI4	Y_GRI5
Average	0.540000	0.420000	0.360000	0.760000	0.600000
	Y_GRI6	**Y_GRI7**	**Y_GRI8**	**Y_GRI9**	
Average	0.660000	0.560000	0.200000	0.000000	

Aligned with the findings in Table no. 7, it is evident that items 4 and 5 continue to be the most frequently reported, reaffirming companies' inclination towards disclosing ESG risks. Additionally, notable newcomers, such as items 6 and 7, gain prominence, indicating a focus on identifying instances of corruption and the implementation of corresponding countermeasures. Notably, discernible disparities emerge between the baseline scenario and the updated timeframe governed by the ESEF regulation.

4.3 Hypothesis test

In view of the results obtained, it is possible, with the caution such an exploratory study of these described characteristics, to accept some of the hypotheses developed above (Table no. 10).

Table no. 10 – Hypothesis test

H	Hypothesis	Test
H1	Influence of the frame of reference	Rejected
H2	Influence of non-financial information and substantial (longitudinal) change	Accepted
H3	The disclosures are related to the size of the company	Rejected
	The disclosures are related to the industry to which the company belongs	Accepted
	The disclosures are related to the company financial profile	Accepted
	The disclosures are related to the country where the company reports	Accepted

Certainly, the sector, country of operation, financial profile, and the extent of non-financial information disclosure emerge as pivotal factors in elucidating the level and characteristics of risk information disclosure. Surprisingly, the size of the business does not appear to significantly influence this disclosure level. While the influence of reference frameworks is palpable, there is a notable alignment observed in the disclosure patterns across various frameworks. This suggests that certain risk-related topics hold consistent prominence irrespective of the chosen framework. These findings align with recent studies, underscoring the profound impact of the pandemic on corporate risk disclosure. Notably, there has been an uptick in the disclosure of operational and financial risks, accompanied by a trend toward more comprehensive information provision. As environmental, social, and governance (ESG) factors continue to gain significance for investors and stakeholders, businesses that transparently disclose their ESG performance are better positioned to foster trust and attract investment, as articulated in the research by Ahmad *et al.* (2023). These insights emphasize the evolving landscape of risk disclosure and its interconnectedness with broader industry trends and global events. A limitation identified in this study and a potential avenue for future research lies in the need to explore at the level of individual company executives. This approach would delve into the incentives influencing managers to opt for higher or lower risk disclosure. Examining the motivations and individual perspectives of executives would provide a more comprehensive understanding of the factors driving disclosure decisions and would open the door to specific strategies for promoting more effective and transparent risk disclosure practices. Another limitation of this study lies in the challenge of disentangling potential overlaps between risk information and non-financial information, posing a methodological hurdle. This issue may gradually resolve as regulatory frameworks become more precise. However, the evolving nature of regulations during the study period introduces a dynamic element that may impact the accuracy of such separations. Future research could benefit from a continued examination of these intricacies as regulatory frameworks mature, providing more clarity and enhancing the precision of the distinction between risk and non-financial information.

5. CONCLUSIONS

The concurrence of a series of external events (the climate crisis, the COVID-19 pandemic, the war instability in Europe) and some phenomena of internal evolution of the business reports (more information, more complexity, financial and non-financial dimension, digital formats), push corporate reporting to new horizons. In that context, risk disclosure is also driven by an increased interest from better informed and digitally empowered stakeholders, as well as by more evolved frameworks considering further issues to the traditional social, environmental and leadership legitimacy challenges. Therefore, an adequate flow of corporate information helps to mitigate the asymmetry of information inherent in production processes and allows adequate monitoring of the activity of large business groups.

The pervasive presence of technology can align seamlessly with enhanced transparency and the democratization of our economies. This scenario allows customers, employees, suppliers, and, ultimately, citizens to contribute to establishing a more equitable balance against traditional corporate power founded on opacity. Nevertheless, it is possible to take a positive view that allows us to understand it as a mutual benefit, to the extent that companies seem to be favoured by a more conscious and loyal clientele, by more productive employees whose talent is retained, by governments that not only do not sanction but subsidize and reward, as well as to reinforce the public image. All those potential benefits should have been enough to prompt more intensive voluntary disclosure by corporations. And although there has been a strong investment in this regard, the result has not been efficient. A huge amount of heterogeneous business reports that are practically impossible to analyse, at least to the level that would be necessary for the real-time decision-making that our competitive environments require. This has caused, in different jurisdictions, and especially in the European Union, the promulgation of increasingly sophisticated and far-reaching regulations regarding mandatory disclosure, currently reaching the point of requiring an advanced digital format. The best example of how this paradigm is being strengthened is represented by the classic financial statements, of an eminently quantitative and historical nature, solidly backed by external audit processes (Drake *et al.*, 2016).

In summary, companies show a progressive link between risk disclosure and non-financial information and are trying to improve their risk reporting in a context where all corporate reporting is evolving, incorporating more dimensions and recipients. In any case, although companies are very familiar with the different international reference frameworks, and regardless of the solidity that these frameworks may show, their implementation continues to be very partial in terms of risk disclosure, which is far from complete. And that it continues to focus eminently on revelations of a heterogeneous and narrative nature. Therefore, given the favourable results achieved in this work, regulators should focus their efforts on improving the non-financial statements as the optimal vehicle for improving corporate risk information. In that context, risk disclosure would have a prominent presence. Businesses should invest in risk management to improve their overall performance and risk disclosure could also help to mitigate costs and boost firm´s value.

This paper is subject to a number of limitations, apart from those outlined at the Results section. First, the manual data collection from annual reports may be affected by some degrees of subjectivity. Second, no weighting is assigned to items, despite some of them might be more useful than others for stakeholders' interest. Finally, this research focuses exclusively on the EURO STOXX 50 sample. Further studies should consider more European countries and industrial sectors, in which risk disclosure may vary differently. In light of the positive outcomes uncovered in this study, regulators are urged to concentrate efforts on enhancing non-financial statements as the optimal conduit for advancing corporate risk information. This underscores the pivotal role of risk disclosure within a broader framework. Businesses are encouraged to invest in robust risk management practices, not only to enhance overall performance but also as a strategic avenue for cost mitigation and the fortification of firm value.

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