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M. Sc. in Management Engineering

# **Disclosure of non-financial information: the case of the STOXX Europe 600 index**

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## Abstract

The aim of this study is to examine the determinants and effects of the European companies' non-financial disclosure in light of the regulatory framework (Directive 2014/95/EU) imposing all large public-interest entities across the European Union to disclose non-financial information. Specifically, I want to analyse whether disclosure-specific variables, sustainability performances, ownership structure and corporate governance affect the level of non-financial disclosure.

The majority of prior literature concerns non-financial disclosure as a voluntary practice, which is not the case anymore for the companies in the EU.

Still, researchers find mixed evidence on the factors affecting non-financial disclosure. Furthermore, most studies take into account only one sustainability-related factor at a time, usually environment or, more rarely, social.

I focus instead on all sustainability-related disclosures encompassed by the GRI guidelines, starting from the assumptions that both investors and other stakeholders can gain higher benefits from the joint consideration of all ESG aspects.

Using as a sample the STOXX Europe 600 and a "material non-financial disclosure score" designed through a consensus approach starting from the GRI Standards guidelines, I find that companies that: report on SDGs, have more dispersed ownership structures, higher sustainability performance, bigger boards of directors, higher board independence display a higher level of non-financial disclosure. Furthermore, company size also positively and significantly influences the level of sustainability disclosure, while capital expenditure significantly influences it in a negative way.

On the other hand, I find no evidence in support of the association with government ownership, being signatory of the Global Compact, board diversity (gender and competencies) and tenure, presence of a CSR committee in the board and with the existence of incentives for CSR performance at executive levels.

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## Executive Summary

In recent years non-financial and sustainability reporting has come to greater prominence worldwide, especially in Europe, where since 2018 all large public interest entities across the EU must report certain non-financial information, following the entering into force of Directive 2014/95/EU.

This new regulatory framework is part of a wider effort by the European institutions to foster the development of sustainable investments across Europe. The European Commission estimated the need for €180bn in additional yearly investments if Europe is to achieve the targets set by the UN 2030 Agenda on Sustainable Development Goals and the Paris Climate Agreement. The Commission recognizes that the involvement of the financial sector will be crucial to fill this investment gap and reach these objectives.

In this context, I set out with the goal of collecting and analysing up-to-date information on the second-year mandatory non-financial disclosure from a sample of European companies. The guidelines of the EU Directive, while mandating information disclosure on some areas, do not prescribe a specific framework or specific indicators that should be used. Therefore, besides some generic topics that should be covered, freedom is left to companies to choose the scope and framework of reporting. In this decision, a key role is played by the concept of materiality. Based on their characteristics and on the business they conduct (so connected strongly with the industry), companies should evaluate which information is most relevant to them and their principal stakeholders.

Therefore, after a qualitative analysis of the data collected, I try to evaluate the possible determinants of a wider or narrower sustainability reporting using a disclosure score that takes into account cross-sector differences in material aspects.

The majority of extant literature on sustainability and non-financial reporting has focused on contexts of voluntary disclosure, often evaluating only specific aspects, especially environmental disclosure.

Conversely, given the wider spectrum of information required in the new regulatory framework, I focused my analysis on all aspects of sustainability reporting. It is well known by now that Environmental, Social, and Governance factors are interconnected to each other and cannot prescind one another, therefore they need to be considered jointly.

Comparability on these matters is known to be difficult for lack of standards and low measurability. A step in the direction of standardization was done by the Global Reporting Initiative (GRI) guidelines. Being the most widely used framework across Europe and considered a de-facto standard, I decided to focus on companies following the GRI reporting guidelines, which by nature cover a wide range of non-financial information and require companies to meet certain quality criteria for the reports to be considered compliant. This allowed me to compare disclosures more rigorously.

Several theories, often leading to contrasting views, have been adopted in the literature to explain different levels of non-financial disclosure and the determinants behind it. Voluntary disclosure theory (Verrecchia, 1983; Dye, 1985) and legitimacy theory (Deegan, 2002) are often cited to explain the assumed relation between ESG performance and disclosure. The former expects a positive relation, with better sustainability performers disclosing more to signal their superior performance, while the latter forecasts a negative relation, as poor performers disclose more to legitimize their position and ease external pressures. Empirical studies have found non-conclusive evidence in favour of either.

These theories have been adopted together (Hummel and Schlick, 2016), to explain a higher quality of disclosure by superior performers and a wider, generic, disclosure by poorer sustainability performers.

Several variables related to ownership structure and corporate governance have also been analysed in relation to non-financial disclosure.

Specifically, a more concentrated ownership is often posited to lead to a lower level of voluntary disclosure. The relation is often justified using agency theory (Jensen and Meckling, 1976) as a more fragmented ownership leads to higher agency costs, and disclosure may act as a substitute for monitoring. Empirical evidence seems to substantiate this expectation (Fatemi et al., 2017).

Strictly related to ownership structure are corporate governance variables. CEO duality, board size, board independence, board diversity and the existence of a CSR committee have been posited to be associated to sustainability disclosure, often using agency theory as a theoretical background for the relation.

The relation between government ownership and disclosure is also debated, both theoretically and empirically.

Firm size is the most widely recognized variable to affect non-financial disclosure, with a clear majority of studies finding a positive association with non-financial disclosure (Hahn and Kühnen, 2013). The relation has often been explained using stakeholder or legitimacy theory, as larger firms face greater pressures from stakeholders (Tamimi and Sebastianelli, 2017). Profitability, level of debt, investments and capital intensity are also among the most widely studied variables, although theoretical expectations and empirical findings are mixed (Hahn and Kühnen, 2013).

A relevant aspect to all authors researching in this field is related to the computation of the disclosure score. Many studies have recognized the potential impact on results stemming from the use of different methodologies for the computation of disclosure scores, and some authors have proved that different scores and approaches lead to different conclusions (Urquiza et al., 2009).

I collected data on the non-financial disclosures of the companies in the STOXX Europe 600, which represents large, mid and small capitalization companies across 17 European countries. Out of these companies, 572 (96%) prepared a non-financial disclosure of which 58% (331 companies) are GRI users and compose the final sample used in my analysis.

Preliminary findings show that 73% of the companies in the final sample are signatories of the UN Global Compact (GC) and 88% adhere to the UN Sustainable Development Goals (SDGs). Data also shows significant differences between countries and sectors. An analysis of the specific indicators disclosed, focusing on sector differences, is carried out, showing that corporate governance related information is usually less disclosed than other types of data across all sectors and that companies in different sectors tend to pay more attention to different disclosure areas.

Starting from the data collected on the GRI indicators disclosed by each company, I computed a material non-financial disclosure score by defining the material indicators for each sector following a “consensus” approach as the indicators disclosed by more than 50% of companies in that sector. This follows the definition of material indicators from SASB, which states that those indicators are the ones likely to be material for 50% or more companies in the sector, and is based on evidence that companies tend to disclose those indicators that are most material to them (GRI and RobecoSAM, 2016).

Through this methodology, I effectively take out the differences in scores deriving from different material indicators across sectors.

Using this score, I run both univariate and multivariate analyses employing non-parametric tests (Mann-Whitney test and Kruskal-Wallis test) and regression models (beta regression model) to test several hypotheses, grouped into four research questions. The use of non-parametric tests and beta regression derives from the non-normality of the score and the heteroskedasticity found in the regression models. The univariate analysis shows statistically significant differences in the material non-financial disclosure score for companies adhering to the UN GC and the UN SDGs.

Regression results show that adhering to the UN SDGs, having a less concentrated ownership, higher sustainability performance, separation between CEO and chairman roles, and higher board independence are related to a higher disclosure score. The control variable of size is also found to be significant in all models, specifically to have a positive relation with disclosure score, while CAPEX just in some of them. The other controlling variables of profitability and level of debt are found non-significant.

Furthermore, being a signatory of the UN GC, the presence of a CSR committee in the board and of incentives at executive level, board size, board gender diversity and board competencies diversity appear not to be associated with disclosure.

To provide the results with further strength, I carried robustness analysis on the regression results by estimating six alternative models. This shows the robustness of my results to the use of different statistical methodologies and different control variables.

Nonetheless, possible limitations remain, especially related to the computation of the score. Future research may want to analyse the effects of the new regulation across years, as 2020 will be the third year from the entry into force of the EU directive.

Moreover, studies may want to explore further the relation between sustainability disclosure and sustainability performance, also given the fact that different ESG scores from different databases show low correlations.

More studies on the association between the non-financial disclosure extent and the presence of CSR incentives for executives and of the CSR committee on the board may be interesting.

The remainder of this work is structured as follows.

Chapter 1 begins with a brief introduction and is then divided in two parts. The first presents the regulatory framework in Europe, the Directive 2014/95/EU, its transposition in some EU member states and a comparison with relevant foreign legislation regarding

sustainability disclosure. The second part presents the most adopted reporting frameworks, with a focus on the GRI guidelines.

Chapter 2 is dedicated to a review of the extant literature. Firstly, it focuses on the differences between contexts of voluntary and mandatory disclosure. Secondly, the issue of materiality, which is a key topic in non-financial reporting, is addressed.

Then, the different disclosure scores and their potential impacts on the results are discussed. Subsequently the key theories and determinants of non-financial disclosure analysed in the literature are presented.

After the literature review, the four research questions which I want to address are introduced, together with the formulation of the hypotheses.

Chapter 3 describes the data collection process and provides some preliminary analysis of the data. The focus is on the differences among sectors and countries. An analysis on specific indicators by sectors is carried.

Chapter 4 contains first the definition of the non-financial disclosure score and the description of its computation, then some preliminary univariate analysis tests, Mann-Whitney tests and Kruskal Wallis tests are carried to evaluate the differences in the level of the disclosure score between sectors, countries and some other relevant variables.

Chapter 5 delineates the multivariate regression models addressing the four research questions. For each model there are assessments of descriptive statistics, Pearson and Spearman correlations, and the results of beta regression estimation.

Chapter 6, finally, is dedicated to robustness analysis on the results of the regression models, with limitations of the analysis, conclusions and suggestions for further research.

# 1 Regulation and reporting frameworks

The chapter begins with a brief introduction. Then it moves on presenting the regulatory framework in Europe, the Directive 2014/95/EU, and its transposition in the key countries and a comparison with foreign legislation regarding sustainability disclosure.

The second part presents the most adopted reporting frameworks, with a focus on the GRI guidelines.

## 1.1 Introduction

Over the past few years, sustainable development and corporate social responsibility (CSR) have become more and more important.

One of the fastest-growing areas in business is socially responsible investment (SRI), which incorporates environmental, social, and governance concerns. From 2007 to 2017, SRI increased from \$2.71 trillion to over \$21 trillion.

As of 2018, \$30.7 trillion was being professionally managed globally under responsible investment strategies, ranging from negative/exclusionary screening to corporate engagement.

Consequently, a higher pressure has fallen on companies towards the sustainability of environmental, social and governance factors (ESG). Indeed, various scandals related to these topics have impacted globally aspects like labour conditions and climate change phenomena. Nowadays, different sets of stakeholders demand higher levels of companies' transparency. Independently from being customers, employees, investors or communities, they are no longer interested only in a company's financial results but are also paying attention to the non-financial information.

At the same time, companies have started to realize that their environmental efforts, their initiatives in favour of better working conditions for their employees and their good corporate governance choices can have an impact on business results.

To show their social responsibility, about 30 years ago firms started to disclose sustainability reports. At the beginning, they were mostly disclosing information on a voluntary basis, moved by the need for legitimization or by the possibility of gaining a competitive advantage

over worse performing competitors; later, legislators in different countries started to make the sustainability disclosure mandatory.

The most recent case, concerning all European Union, is the Directive 2014/95/EU that makes mandatory non-financial disclosure for large public-interest entities across Europe: companies subject to the Directive are required to disclose information relating to *“at least, environmental matters, social and employee-related matters, respect for human rights, anti-corruption and bribery matters”*. The Directive entered into force on 1st January 2018, with reference to the previous fiscal year, and all member states of the European Union had to transpose it with a national law. As outlined in the Directive, the information that should be disclosed is that related to matters which are most likely to bring about the materialisation of principal risks of severe impacts, along with those that have already materialised.

Some flexibility is left to the companies’ judgement, and this paves the way for a variability in the extent of non-financial disclosure, with some organizations that will be likely to disclose more than others.

Several research studies have been carried out during the years in order to understand the determinants that lead companies to cover a wider or smaller amount of disclosure aspects – either financial or non-financial – and to report with a different quality. Most of such extant studies are set in a context where non-financial disclosure is voluntary: with disclosure becoming mandatory, some of the already identified relations may not hold anymore. My study aims at addressing the determinants of non-financial disclosure in the new mandatory environment in Europe.

## **1.2 Regulation**

### **1.2.1 European Union towards regulation**

In the world, the European Union has always been on the front-line regarding environmental and social matters. It was soon understood that some kind of regulation was needed.

On April 13th, 2011 – in a communication named *“Single Market Act - Twelve levers to boost growth and strengthen confidence - Working together to create new growth”* – the EU Commission recognized the need to have across all EU Members *“a similar high level of transparency of the social and environmental information provided by companies in all sectors”*.



Six months later, on October 25th, 2011, in the communication *“A renewed EU strategy 2011-2014 for Corporate Social Responsibility”*, the European Commission restated the key role of social and environmental information disclosure in order *“to facilitate engagement with stakeholders and the identification of material sustainability risks”* and highlighted the need of a legislative proposal on the transparency of social and environmental information provided by the firms.

On February 6th, 2013, the European Parliament has acknowledged that the *“disclosure of non-financial information is vital for managing change towards a sustainable global economy by combining long-term profitability with social justice and environmental protection”*.

### **1.2.2 Directive 2014/95/EU**

On October 22nd, 2014, the European Parliament released the Directive 2014/95/EU *“regarding non-financial and diversity information reporting by certain large undertakings and groups”*.

#### **1.2.2.1 Companies subject to the directive**

The Directive applies to all *“large public-interest entities exceeding on their balance sheet dates the criterion of the average number of 500 employees during the financial year”*.

Noteworthy, this condition on the number of employees means that small and medium-sized enterprises (SMEs) are excluded since UE Recommendation 2003/361 defines SMEs as companies with < 250 employees and turnover ≤ €50m or balance sheet total ≤ €43m.

However, each EU member state has the possibility to adjust the requirements considering other parameters such as the balance sheet total or the net turnover.

Member States also have the possibility to require non-financial disclosure from companies that would not be subject to the Directive.

In fact, public-interest entities are:

- Entities whose transferable securities are admitted to trading on a regulated market of any Member State
- Credit institutions
- Insurance undertakings
- Entities designated by Member States as public-interest entities, for instance undertakings that are of significant public relevance because of the nature of their business, their size or the number of their employees.

### **1.2.2.2 Information to be disclosed**

Directive 2014/95/EU states that companies have to disclose information relating to *“at least environmental matters, social and employee-related matters, respect for human rights, anti-corruption and bribery matters”*.

The disclosure should include:

- A description of the policies adopted in relation to the previous matters
- The outcome of the adopted policies
- The main risks related to the previous matters, classified in terms of severity
- Information on the due diligence processes implemented, also regarding, where relevant and proportionate, its supply and subcontracting chains, in order to identify, prevent and mitigate existing and potential adverse impacts.

In case the company does not adopt policies to address the previous matters, the non-financial statement should provide a reasonable explanation for not doing so.

Organizations are allowed to omit information if *“the disclosure of such information would be seriously prejudicial to the commercial position of the undertaking, provided that such omission does not prevent a fair and balanced understanding of the undertaking's development, performance, position and impact of its activity”*.

### **1.2.2.3 Non-compliance**

The Directive leaves to Member States the definition of any penalty to impose upon companies failing to report adequately.

#### **1.2.2.4 How to report**

In terms of disclosure methodology, the Directive 2014/95/EU leaves companies flexibility. They may use a national, EU-based or international framework. Companies can adopt the framework they prefer – either one or more – but it is required that they specify which ones they have chosen.

The European directive gives companies freedom also on the format to present the required information: in a standalone report or including the information in the annual management report. Should the company choose the first option, the report should be coherent with the management report and be disclosed no more than six months after the management report.

The choice of one format over another has some impacts:

- Annual report: including non-financial information in the annual report means that this data will be readily available to stakeholders at the same time as wider information about the company. Companies choosing this approach usually reserve a section of the annual report to cover the sustainability aspect. However, due to concerns about length, complexity, and flow of the overall annual report companies might be tempted to discuss relatively fewer ESG issues.
- Sustainability report: the report is completely dedicated to non-financial information, which can therefore be analyzed more in depth.
- Integrated report: this is a format suggested by the International Integrated Reporting Council (IIRC). Non-financial and financial data are presented in an integrated way within the annual report offering to investors a more rounded and holistic view into business performance. The basic concept is that the overall company performance depends on six different forms of capital (financial, manufactured, intellectual, human, social and relationship, natural) and therefore the related information must be reported altogether.

#### **1.2.2.5 Parent and subsidiaries**

According to the directive, *“public-interest entities which are parent undertakings”* must make a non-financial disclosure regarding all the group’s performance, position and impact of its activity in terms of environment, social and employee matters, human rights and anti-

corruption issues. Subsidiaries are exempted from the obligations if the relevant information about them is included in the consolidated management report of the parent company.

#### **1.2.2.6 The role of statutory auditors or audit firms**

According to the Directive 2014/95/EU, statutory auditors or audit firms have only to check whether the non-financial statement has been provided.

However, member states *“may require that the information in the non-financial statement or in the separate report be verified by an independent assurance services provider”*. Therefore, the Directive leaves to the member state the definition of whether or not non-financial disclosure reports have to be verified by an independent assurance service provider.

#### **1.2.2.7 Deadline**

According to the Directive, companies are required to include non-financial statements in their annual reports starting from 2018, on information relating to the 2017 financial year.

#### **1.2.2.8 European guidelines on non-financial reporting**

The European Commission published in 2017 the *“Guidelines on non-financial reporting”* to provide a general methodology for the preparation of non-financial reports. It identifies some key principles that should be followed in the non-financial disclosure process:

- Disclose material information
- Fair, balanced and understandable
- Comprehensive but concise
- Strategic and forward-looking;
- Stakeholder oriented;
- Consistent and coherent;

### **1.2.3 Transposition of Directive 2014/95/EU in key European countries**

Each EU member transposed the Directive into national law. As key countries I considered Germany, France, United Kingdom, Italy, Spain, and Sweden.

#### **1.2.3.1 Germany**

In terms of conditions that make the non-financial disclosure mandatory for public-interest entities, Germany applies the Directive threshold of minimum 500 employees; moreover, they set a second condition consisting in the subject company having:

- net sales higher than €40m, or
- total assets higher than €20m.

In case of non-compliance or omission of the penalty is a fine of an amount which is the highest between €10m or the total annual revenues of the company or twice the amount of gained profits or losses avoided because of the violation and possibly even imprisonment;

In Germany there was no comprehensive legislation about corporate social responsibility (CSR) reporting but only a Sustainability Code which was a non-mandatory framework that could be used for CSR reporting on a voluntary basis.

#### **1.2.3.2 France**

Like Germany, also France adds the same conditions used by Germany on net sales and total assets to the 500 employees condition. However, France extends the company scope also to non-listed companies with a balance sheet of at least €100m or net turnover of €100m and at least 500 employees. In terms of auditors' role, French legislation requires a presence of an auditor's statement that verifies the disclosed information for companies with more than 500 employees and either net sales or total assets over €100m.

In case of non-compliance or omission of information there is not a fine set by the law ex ante. The possibility of a penalty depends on a stakeholder asking for the disclosure of the missing non-financial information. Only after such request, financial penalties can be imposed by a judge.

Already before the transposition of the EU Directive, France had an extensive set of laws covering the non-financial disclosure area. Since 2001 all listed French companies must

disclose non-financial information, with particular emphasis on the social and environmental impact of the company's activities. This information has to be included in the annual report. In 2010, the Grenelle II extended the obligation also to non-listed companies that had more than 500 employees and either total assets or total sales higher than €100m. France also requires the disclosure of specific KPIs, while the other countries do not. Therefore, there is the risk of a proliferation of different KPIs between companies limiting the comparability of the reports.

### **1.2.3.3 United Kingdom**

The United Kingdom transposition of the Directive 2014/95/EU does not add any specific conditions for the companies.

The United Kingdom leaves the choice of the reporting format to the company, but the integrated reporting is strongly encouraged.

From 2013, UK quoted companies are required to prepare a separate Strategic Report alongside the Annual management report. The rule obliged the firms to disclose on human rights issues, gender representation across the company and on greenhouse gas (GHG) emissions.

The UK Modern Slavery Act 2015 requires certain large UK and non-UK businesses to release reports on steps taken to consider the risks associated with suspected human trafficking or coerced labour in their businesses and throughout their supply chains.

Now the guidelines from the government follow the ones of the EU directive without adding any prescriptions.

The non-financial report must be audited for compliance with legal requirements and any material misstatements.

Failure to comply is by a fine to possibly each director, and the auditor

#### **1.2.3.4 Italy**

In Italy, the Directive 2014/95/EU has been transposed with the CONSOB's resolution n. 20267 of January 18th, 2018 which officially implements the d. lgs. 254/2016.

The d. lgs. 254/2016 transposes in the Italian law system new transparency requirements to which Italian companies need to comply, as suggested by the Directive set by the European Union.

CONSOB added to the 500 employees condition the other two on net sales and total assets on the same amount as Germany and France.

The Italian public-interest companies are defined by the d. lgs. n. 39/2010 and can be identified mainly as:

- listed companies
- banks
- insurance companies

The non-financial disclosure should cover the areas prescribed by the European Directive (no additional prescriptions).

In case of non-compliance or lack of disclosure, companies' directors are held responsible and can be punished with a fine going from €20k to €100k according to the severity of the omission. In contrast with the countries mentioned above in Italy also the auditors and the individuals responsible for verification/control can be fined.

Like the European Directive, also the Italian regulation does not define any mandatory framework to be used but it leaves freedom of choice to companies that, however, must clearly express which framework they are using. Moreover, changes in the adopted framework from one year to the next one must to be properly explained.

Parent companies, as per guidelines from the European Directive, have to disclose non-financial information about all the group.

It is relevant to notice that, before the transposition of the EU Directive, Italian companies that disclosed non-financial information used to do it on a voluntary basis.

Indeed, there was no law making the non-financial disclosure mandatory and, as a result, corporate social responsibility reporting was a limited phenomenon.

### **1.2.3.5 Spain**

In Spain, prior to the EU Directive transposition, only public administrations were required to publish an annual sustainability report (KPMG, 2015). Differently, corporations were left with the possibility of deciding voluntarily whether to release a corporate social responsibility report or not.

Now with the transposition of the Directive all companies with more than 500 employees must disclose. Spain, like Italy, Germany, and France added the same conditions on net sales and total assets. Moreover, Spain enlarges the scope to entities who, during two consecutive years, at the closing date of each year, have net sales higher than €2bn and more than 4,000 employees: in other words, Spain makes the non-financial disclosure mandatory for very large and relevant Spanish companies despite not being listed.

In terms of auditors' role, Spain does not make any change with respect with the Directive. Spain has not defined financial penalties for non-compliant companies.

### **1.2.3.6 Sweden**

The Swedish transposition of the EU Directive reduces the minimum number of employees required and adds two conditions:

- more than 250 employees<sup>1</sup>
- net turnover of more than SEK 350 million, or
- a balance sheet total of more than SEK 175 million.

The companies must disclose non-financial information if at least two of the above criteria are fulfilled. The Swedish implementation applies to all companies.

## **1.2.4 Regulations outside the EU**

### **1.2.4.1 Switzerland**

Switzerland is in Europe but is not a member of EU, so the Directive 2014/95/EU does not apply for this country. As yet, Swiss law does not provide for any binding obligations to report on human rights impacts and related issues, so except for the Swiss companies with subsidiaries in the EU the non-financial disclosure is voluntary.

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<sup>1</sup> Same condition on employees applies in Denmark and Finland transpositions of the EU Directive



The Swiss government has stated its intention to propose legislation that would align with the EU Directive.

#### **1.2.4.2 United States**

Non-financial disclosure in the US is mostly voluntary. Corporate and annual reports are regulated by the Security and Exchange Commission (SEC) which obliges companies to submit yearly documents (Forms 10-K). On February 2nd, 2010, the SEC issued the “Commission Guidance Regarding Disclosure Related to Climate Change” which describes several disclosure requirements concerning climate change that US publicly traded companies need to meet in their filings if the climate issue is material to their business. Particularly, companies need to disclose:

- Cost of environmental compliance: companies must provide information about how the compliance to materials-discharge laws may have an impact on capital expenditures and company performance.
- Material legal proceedings: companies have to disclose if they are involved in legal proceedings arising from environmental issues.
- Risk factors: companies must discuss risks material to their activity, for example risks related to greenhouse gas regulations or other environmental issues.
- Physical impact of climate change: companies have to disclose how climate change could affect their business.
- Management’s Discussion and Analysis of Financial Condition and Results of Operations: companies need to disclose information about how legal, technological, political and scientific developments regarding climate change may affect company’s performances.

In April 2016, the SEC issued a “*Concept Release*” seeking public comments on 340 topics related to corporate information disclosure requirements for publicly-traded companies under Regulation S-K. Several topics of the “*Concept Release*” were devoted to sustainability, non-financial and ESG issues with a focus on climate change, resource scarcity and corporate social responsibility, therefore creating expectations for further clearer guidelines on these topics (Merrill, 2016).

In October 2017, stemming from the previous Concept Release, the SEC published the “*FAST Act Modernization and Simplification of Regulation S-K*” which proposes amendments to simplify the disclosure requirements of the existing S-K Regulation. However, these amendments only regard the Governance aspect without referring to sustainability disclosure or ESG as a whole (Boerner, 2017).

In March 2019, the SEC adopted changes to its rules and forms designed to modernize and simplify disclosure requirements. The final amendments of the “*FAST Act Modernization and Simplification of Regulation S-K*”, which were adopted largely as originally proposed in 2017, are part of the SEC’s ambitious housekeeping effort, the Disclosure Effectiveness Initiative. The final amendments are intended to eliminate outdated, repetitive and unnecessary disclosure, lower costs and burdens on companies and improve readability and navigability for investors and other readers.

Largely missing, however, are any changes to the basic rules governing how companies provide information to investors about risk, including emerging ESG risks. In part, this is because of persistent concerns that such reforms could result in costly over-disclosure that will overload investors and obscure useful information (Harper Ho 2019).

The result is that currently in the US there is mix of required and mostly voluntary ESG reporting which often produces incomplete, inconsistent and noncomparable reports.

#### **1.2.4.3 South Africa**

South Africa can be considered an example of strong sustainability disclosure: all the companies that want to get listed on the Johannesburg Stock Exchange (JSE) must apply *the King Report on Corporate Governance*.

From the 2nd edition (2002), the King Code also includes sections on sustainability. In 2016, the 4th version - King IV - was issued, and it is the one currently in force.

However, it is important to notice that the King Code does not have a legal status, rather it is “*a set of voluntary principles and leading practices*” on corporate governance.

On the other hand, South African companies listed on the JSE are required since 2010 to prepare integrated reports (therefore including sustainability) in accordance with JSE listing requirements.

## 1.3 Reporting Standards

In this section, a review of the most commonly adopted non-financial reporting frameworks and sustainability disclosure standards will be provided.

### 1.3.1 Global Reporting Initiative

According to KPMG's Survey of Corporate Responsibility Reporting 2017, frameworks suggested by Global Reporting Initiative (GRI) are the most commonly adopted, with 63 percent of the largest 100 companies (N100), and 75 percent of the Global Fortune 250 (G250) reporting applying the GRI reporting framework.

### 1.3.2 GRI G4

The G4 – issued in 2013 – is the fourth update of the 'GRI Sustainability Reporting Guidelines' and it *"helps reporters prepare sustainability reports that matter, contain valuable information about the organization's most critical sustainability-related issues, and make such sustainability reporting standard practice"*. The G4 guidelines have been developed through an extensive cooperation with hundreds of reporters, report users, professional intermediaries and with the involvement of representatives from business, labour, civil society, audit and financial markets to create guidelines applicable to all organizations. G4 guidelines consist in a set of Reporting Principles and Standards Disclosures.

#### 1.3.2.1 Reporting Principles

The Reporting Principles are designed to be applied by companies when making their sustainability report with the purpose of achieving an acceptable level of transparency. The principles are divided into two groups:

- Principles for Defining Report Content: they help the company to identify which topics the disclosure should cover. The idea is that a company should disclose topics that are material to its business, activities, impacts and that are relevant for the stakeholders. Particularly, four principles fall in this category: stakeholder inclusiveness, sustainability context, materiality and completeness.
- Principles for Defining Report Quality: they help the company to provide quality information on the topics considered to be relevant. Indeed, for the stakeholders it is

important that the information is disclosed in such a way they can use it to make proper assessments and take appropriate actions. This category includes six principles: balance, comparability, accuracy, timeliness, clarity and reliability.

### **1.3.2.2 Standard Disclosures**

Standard Disclosures represent areas that should be included by companies in their non-financial disclosure. They are divided into two categories:

- **General Standard Disclosures:** these should be applicable to all organizations that are preparing a non-financial report independently from firms' characteristics and sector.

The General Standard Disclosures are divided into seven areas:

- **Strategy and analysis:** it provides a general strategic view of the organization's sustainability. The aim of this area is to create a proper context for more detailed subsequent non-financial information.
- **Organizational profile:** it provides an overview of the organizational profile of the company.
- **Identified material aspects and boundaries:** it provides an indication of the process followed by the company to define the report content, material aspects, and boundaries.
- **Stakeholder engagement:** with these disclosures the company should provide an overview of the engagement it had with all the stakeholders during the reporting period.
- **Report profile:** it provides an overview of the basic structural information about the report.
- **Governance:** it provides an overview of the corporate governance with a particular focus on how it addresses risk management, sustainability reporting and economic, environmental and social performance evaluation.
- **Ethics and integrity:** it provides an overview of the company behaviour in relation with ethics and integrity internal processes.

- Specific Standard Disclosures: they are organized in three categories: economic, environmental and social, with the latter being further sub-divided into labor practices and decent work, human rights, society and product responsibility.
  - Economic: it refers to the firm's impact on the economic conditions of its stakeholders and on the economic system at a local, national and global level.
  - Environmental: it refers to the firm's impact on the living and non-living natural systems.
  - Social: it refers to the firm's impact on the social systems within which it operates.

Each category is composed by several aspects that the disclosing company should report if they are recognized as material on the basis of the reporting principles for defining report content.

The General Standard Disclosures are 58 while the Specific Standard Disclosures are 57.

The G4 guidelines provide organizations with two options to prepare their sustainability report depending on the depth level they want to adopt in their reporting:

- Core option: it contains the basic information of a sustainability report;
- Comprehensive option: building on the core option, the comprehensive adds further Standard Disclosures of the company's strategy, governance, ethics and integrity. Moreover, while the core option only requires disclosure of at least one indicator related to each material aspect, the comprehensive option requires disclosure of all indicators related to each material aspect.

According to the Global Reporting Initiative, the GRI G4 are being phased out since June 2018.

### **1.3.3 GRI Standards**

The GRI Sustainability Reporting Standards – better known as GRI Standards – have been released in October 2016 and they represent the latest evolution of the GRI's reporting framework, replacing the GRI G4. They are required for all reports or other materials published on or after 1 July 2018. GRI Standards have a modular and interrelated structure and are divided into Universal Standards and Topic Specific Standards: the former are used by every company making a sustainability report while the latter are chosen on the base of topic materiality.

### **1.3.3.1 Universal Standards**

**GRI 101 – Foundation:** they are the starting point for any company that wants to adopt the GRI Standards since they set the principles to be followed for defining reporting content and quality.

**GRI 102 – General Disclosures:** they define how to report contextual information about an organization and its sustainability reporting practices. GRI 102 include information about the company profile, strategy, ethics and integrity, governance, stakeholder engagement practices, and reporting process. The topics within this section are 56.

**GRI 103 – Management Approach:** they set guidelines for reporting information about how the management approach that the company has towards material issues.

### **1.3.3.2 Topic Specific Standards**

**GRI 200 – Economic:** they are specific standards covering economic performance, market presence, indirect economic impact, procurement practices, anti-corruption and anti-competitive behaviour.

**GRI 300 – Environmental:** they are specific standards covering materials, energy, water and effluents, biodiversity, emissions, effluents and waste, environmental compliance and supplier environmental assessment.

**GRI 400 – Social:** they are specific standards covering employment, labour/management relations, occupational health and safety, training and education, diversity and equal opportunity, non-discrimination, freedom of association and collective bargaining, child labour, forced or compulsory labour, security practices, rights of indigenous people, human rights assessment, local communities, supplier social assessment, public policy, customer health and safety, marketing and labelling, customer privacy and socioeconomic compliance

### **1.3.3.3 G4 Sector Specific Disclosures**

Companies may decide to add the G4 Sector Disclosures, which were developed for use with the GRI G4 guideline but remain valid for reporting with the GRI Standards.

They contain sector-specific guidance for ten sectors:

- Airport operators
- Construction and real estate
- Electric utilities
- Event organizers
- Financial services
- Food processing
- Media
- Mining and metals
- NGO
- Oil and gas

The use of the G4 Sector Disclosures is recommended for organizations using the GRI Standards but is not a requirement for preparing a report in accordance with the Standards.<sup>2</sup> The Global Sustainability Standards Board (GSSB), GRI's independent standard-setting body, intends to develop further sector contents, which will describe sectors' most significant impacts from a sustainable development perspective.

### **1.3.4 Sustainability Accounting Standards Board**

Sustainability Accounting Standards Board (SASB) – founded in 2011 – is the organization that issues the Sustainability Accounting Standards. Its aim is to offer proper accounting standards on sustainability topics that US companies can integrate in their annual filings with the SEC. Indeed, the developed standards focus on aspects that might affect the financial condition or the operating performance of a company and therefore considered material under Regulation S-K.

SASB developed the standards from 2012 to 2016. In 2017, it released a further update – known as *Exposure Draft of the Standards* - that integrated the already existing ones in 2018.

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<sup>2</sup> GRI 101: Foundation, Section 2

The standards have been created with the idea of meeting the need for industry-specific sustainable measures that could facilitate companies' disclosure of non-financial material information and, at the same time, to make comparison and benchmarking among reports easier.

Compared to GRI, SASB is more prescriptive and focuses more on comparability. The reason lies in the different stakeholder targeted by the two standards: SASB has mostly investors in mind, while GRI is more useful to target a broader class of stakeholders, like customers and local authorities. To this point, it is important to notice that the choice of the standard used for reporting should have clear in mind the purpose of the non-financial reporting and its audience, i.e. which specific stakeholders are targeted and how they will use the disclosed information.

Currently, the SASB has standards for 11 sectors which are then broken down into 79 industries. The 11 sectors considered are: health care, financials, technology and communications, non-renewable resources, transportation, services, resource transformation, consumption I, consumption II, renewable resources and alternative energy, infrastructure.

The standards identify 5 relevant groups of issues that need to be monitored, evaluated and reported using the suggested indicators. The 5 groups are: environment, social capital, human capital, business model and innovation, leadership and governance.

Each group is then divided into a given number of issues. For each issue, each industry has its own disclosure topic and accounting metrics that satisfy the materiality criteria for a company operating in that industry.

It must be pointed out that currently just 103 companies worldwide are applying SASB reporting<sup>3</sup>.

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<sup>3</sup> <https://www.sasb.org/company-use/>



### 1.3.5 United Nations Global Compact

The Global Compact (UN GC) is a world corporate sustainability initiative organized by the United Nations that aims at encouraging companies to align their strategies and operations with sustainable and socially responsible policies. The Global Compact proposes ten principles that each signatory company should integrate in its strategies, policies and procedures. The ten principles cover the areas of human rights, labour, environment and anti-corruption:

#### Human rights:

- Principle 1: *Businesses should support and respect the protection of internationally proclaimed human rights; and*
- Principle 2: *make sure that they are not complicit in human rights abuses*

#### Labour:

- Principle 3: *Businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining;*
- Principle 4: *the elimination of all forms of forced and compulsory labour;*
- Principle 5: *the effective abolition of child labour; and*
- Principle 6: *the elimination of discrimination in respect of employment and occupation.*

#### Environment:

- Principle 7: *Businesses should support a precautionary approach to environmental challenges;*
- Principle 8: *undertake initiatives to promote greater environmental responsibility; and*
- Principle 9: *encourage the development and diffusion of environmentally friendly technologies.*

#### Anti-Corruption:

- Principle 10: *Businesses should work against corruption in all its forms, including extortion and bribery.*

Companies that decide to adhere to the UN Global Compact, besides incorporating the ten principles in their corporate plans, need to provide a report each year – named Communication on Progress, COP – that shows their undertaken actions and results. The Communication on Progress must contain three mandatory sections:

- 1) A statement of the company's CEO that expresses a continued support towards the Global Compact;

- 2) A description of the practical actions, policies, procedures or activities that the company has adopted to implement the Global Compact;
- 3) A measurement of outcomes with indicators that show the results of the company's efforts.

The UN provides a “Basic COP Template” that the reporting companies can follow, but it also invites participants that want to report more thoroughly to adopt the GRI reporting framework. According to the UN, more than 12,000 companies have joined the Global Compact.

### 1.3.6 United Nations Sustainable Development Goals

Among the main objectives of the UN GC, besides striving to make the ten principles an integral part of every company strategy, there is the achievement of the UN Sustainable Development Goals (SDGs).

In September 2015, with the resolution 70/1, the UN General Assembly adopted a plan that lays out a path to be followed in the next 15 years to “end extreme poverty, fight inequality and injustice, and protect our planet”<sup>4</sup>. The plan is commonly addressed as the “2030 Agenda”. 17 Sustainable Development Goals are defined (see figure 1). Each goal is articulated in a series of targets, for a total of 169.



Figure 1: Sustainable Development Goals

<sup>4</sup> <https://www.unglobalcompact.org/sdgs/about>

### 1.3.7 Principles for Responsible Investment

Principles for Responsible Investment (PRI) is an organization (supported by the United Nations) which works to understand the investment implications of environmental, social and governance (ESG) factors.

They have defined six Principles for Responsible Investment, which are a set of voluntary investment principles which offer a variety of possible actions for incorporating ESG issues into investment practice:

- Principle 1: *We will incorporate ESG issues into investment analysis and decision-making processes.*
- Principle 2: *We will be active owners and incorporate ESG issues into our ownership policies and practices.*
- Principle 3: *We will seek appropriate disclosure on ESG issues by the entities in which we invest.*
- Principle 4: *We will promote acceptance and implementation of the Principles within the investment industry.*
- Principle 5: *We will work together to enhance our effectiveness in implementing the Principles.*
- Principle 6: *We will each report on our activities and progress towards implementing the Principles.*

### 1.3.8 Carbon Disclosure Project

The Carbon Disclosure Project (CDP) is an organization which supports companies, investors and cities to “*build a truly sustainable economy by measuring and understanding their environmental impact*”.<sup>5</sup> Particularly, CDP offers a Disclosure Platform that helps companies to disclose their data about climate change, deforestation and water security and it helps them both to evaluate the impact of their actions and to develop improving strategies. At the same time, investors can join CDP platform as well: this allows them to analyse companies from the sustainability point of view and to protect their investments from environmental risks. Given the standardized nature of the framework and the rating mechanisms (companies are assigned a rating from D to A based on the answers to a set of questions submitted

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<sup>5</sup> <https://www.cdp.net/en/info/about-us>

annually), it provides easily comparable information on how a company manages environmental risks and opportunities. The standardized and comparable nature of the framework makes it particularly appealing to investors.

### **1.3.9 Climate Disclosure Standards Board**

Climate Disclosure Standards Board (CDSB) is an international consortium of businesses and environmental NGOs “committed to advancing and aligning the global mainstream corporate reporting model to equate natural capital with financial capital”<sup>6</sup>. To achieve its objective, CDSB offers two reporting frameworks helping companies in disclosing environmental, natural capital and climate change related information in a rigorous way.

- The first framework is for “reporting environmental information, natural capital and associated business impacts”. It consists in 7 guiding principles, which help make sure that the disclosed information is material, correct and useful. Then, there are 12 requirements designed to create a standardization in the disclosure process. The requirements are divided in 4 areas: governance, strategy, risk management, metrics and targets.
- The second framework is for “advancing and aligning disclosure of climate change related information”. Particularly, disclosure should include a strategic analysis about the long-term and short-term impact that climate change might have on the company, a section about climate change related risks and opportunities, references to the action taken by the management to address the previous risks and opportunities. A second part is dedicated to the green-house gas emissions.

While GRI, SASB, UN GC, SDGs, cover a broader range of sustainability-related topics, the CDP and the CDSB are more focused.

### **1.3.10 Integrated Reporting Framework**

The Integrated Reporting Framework – issued by the International Integrated Reporting Council (IIRC) – aims at defining principles and content elements that should characterize an integrated report. The IR framework builds on the idea that there is a strong interdependency between 6 kinds of capital that create value for the company: financial, manufactured,

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<sup>6</sup> <https://www.cdsb.net/our-story>

intellectual, human, social and relationship, natural. In other words, the key concept is that the long-term value is created by factors additional to financial performance such as reliance on the environment, social reputation, human resources skills and others. It is important to highlight that integrated reporting should be considered as something more than just a report: indeed, behind the periodically released report there is an extensive underlying effort to comprehensively understand the strategies adopted by the company, with their risks, opportunities and impact on the environment as well as on society. The process itself is not simple and it requires a remarkable commitment: however, the benefits that can be obtained are relevant both for the company and for its stakeholders. Stakeholders can improve their understanding of the company, thanks to a more thorough disclosure, also non-financial; on the other side, companies can leverage the reporting process to scrutiny and dissect their business impacts and risks with the possibility of taking better informed decisions. According to the framework, companies can also adopt a different categorization of capitals according to their needs: however, the six identified by the IR framework are to be used as a guideline to ensure the organization does not overlook a capital that it uses or affects.

## 2 Literature Review

To identify research papers, scientific articles and books that are relevant for the topic of interest I adopted the following search methodologies:

- Keyword research in several knowledge base websites including Scopus, Science Direct, SSRN, Emerald Insight, and Google Scholar.
- Identification of further relevant papers cited in the material retrieved with the keyword research.

### 2.1 Voluntary or mandatory disclosure?

Since the first stand-alone sustainability reports started being released by companies in the late 1980s, the number of reports published each year has increased constantly (KPMG 2017). At the beginning, such disclosing practice was adopted on a voluntary basis (Crawford and Williams 2010) by firms that were trying to attain or regain legitimacy (Hooghiemstra 2000) or to reduce regulatory pressures (Berthelot et al., 2003) or to gain a competitive advantage over worse performing industry peers (Fung et al., 2002).

Then, an increasing demand for standardization, transparency and accountability arising from various stakeholders and from the general public (Hutchison and Lee, 2005; Berthelot et al., 2003) lead institutions to introduce some mandatory laws about non-financial disclosure.

Today, with the European Commission making non-financial disclosure mandatory from 2018 through the Directive 2014/95/EU, it is still worth wondering whether it is better to have mandatory laws enforcing sustainability disclosure or to leave freedom of choice to firms.

This section will review the main scientific papers that address the mandatory versus voluntary disclosure issue.

Eccles (2012) expresses the belief that, also in a context where integrated reporting is not mandatory, good companies might still have an incentive to do it. Good companies can indeed use integrated reporting as an opportunity to communicate to all stakeholders their sustainable strategy and their effort to create value for shareholders while contributing to a sustainable society at the same time. However, Eccles also believes that the expansion of non-financial disclosure to all companies on a global scale can be done only by making it mandatory, otherwise the market will only have an incomplete set of non-financial information since bad companies are not likely to voluntarily disclose their information.

A study (Eccles et al. 2014) focuses on the financial benefits that companies can get from voluntarily adopting sustainability policies.

The researchers identified 180 US companies that voluntarily adopted sustainability policies before 1993, labelling them as High Sustainability Companies (HSC), and compared them to firms that did not adopt any of those policies, named Low Sustainability Companies (LSC). In the time horizon from 1993 to 2009, besides outperforming LSC in terms of stock return and accounting performance, HSC also turned out to be more long term oriented, to have well established process for stakeholder engagement and to exhibit higher measurement and disclosure of non-financial information.

Therefore, the authors managed to demonstrate that an adoption of sustainable policies, even if not mandated by the law, can have positive consequence on companies.

Crawford and Williams (2010) investigated how country contexts can put pressure on firms in terms of greater reporting activity and disclosure quality. Their research leverages the theory that institutions are composed regulative, normative and cultural elements - or pressures - (Scott 2003) with regulative elements represented by rules and laws; normative aspects represented by social obligations and certifications; cultural elements represented by common beliefs. Although in some institutions one of the three elements might stand out more than the others, they usually coexist and work interconnectedly (Hoffman 1999).

The three institutional pressures create an institutional context where companies operate and decide how and what to disclose. Therefore, Crawford and Williams (2010) compared the quality of disclosure in two countries where the institutional pressure is different to see whether this difference impacts the disclosure. They focused on France, characterized by regulations mandating non-financial disclosure, and on the US, where social reporting is mostly voluntary. The comparison was made considering the banking sector and it demonstrated that French banking institutions were obtaining higher scores for their disclosure efforts than US banking institutions.

In conclusion, this research study managed to demonstrate that firms in high-level mandatory disclosure environments produce better quality disclosure than firms in environment with lower pressure.

Another study that demonstrates the benefits of mandatory disclosure regulations was carried out by Ioannou and Serafeim (2017). They applied a difference-in-difference estimation methodology with propensity score matched samples in order to analyze the

consequences of regulations requiring firms (i.e.: treated firms) to disclose ESG information in China, Denmark, Malaysia and South Africa. All these countries were mandating non-financial disclosure prior to 2011, therefore enabling the researchers to collect data about disclosure for both the period before and after the enforcement. To test the effect of the introduction of the mandating regulation in the four countries, the authors created two control groups: one made of companies from the rest of the world and another made only by US companies. The main findings show that before the introduction of the regulation, both treated and control firms were having the same ESG disclosure score. Then, in the year of the introduction, the ESG disclosure score of treated firms significantly increases if compared with the control groups. Therefore, the study concludes that the presence of non-financial disclosure mandating regulations has a significant impact on the quality of the non-financial disclosure itself.

Wang et al. (2017) tried to evaluate the impact and consequences of mandatory disclosure regulations by analyzing 1,830 standalone corporate social responsibility (CSR) reports published by Chinese listed companies in the period going from 2009 to 2012.

Their finding demonstrates that mandatory regulation leads to an overall improvement in the CSR reporting quality, though this relationship is mitigated by the firm size, meaning that larger companies seem to improve the CSR disclosure quality more than smaller firms.

Grewal et al. (2019) have examined instead the equity market reaction to the Directive 2014/95/EU. They predict and find an average negative market reaction of -0.79% across all firms, a less negative market reaction for firms having higher pre-directive non-financial performance, and a less negative reaction for firms having higher pre-directive non-financial disclosure levels, with results that are accentuated for firms having the most material ESG issues.

The authors found that the negative market reaction is concentrated in firms with weak pre-regulation ESG performance and disclosure, which exhibit an average return of -1.54%; in contrast, firms with strong pre-regulation disclosure and performance exhibit an average positive return of 0.52%. Overall, the results are consistent with the equity market perceiving net costs (benefits) for firms with weak (strong) non-financial performance and disclosure around key events surrounding the mandatory disclosure regulation of non-financial information.



## 2.2 The role of materiality

The activity of reporting sustainability related information is becoming more widespread among companies, with the financial community showing a growing interest towards the non-financial disclosed data (KPMG, 2017). However, there is a significant barrier that is still preventing sustainability information from being as important as the financial one. It is the concept of materiality: one of the biggest challenges is in fact determining which environmental, social and governance issues are truly important in terms of their impact on value creation (Eccles et al., 2012). As materiality is a cornerstone concept in financial reporting (Lee, 1984), so it is in non-financial reporting.

Guidelines to define materiality for non-financial information have been issued both by public and private organizations. They tend to include in the definition of “material non-financial information” every non-financial aspect that might be relevant to the decision-making process. However, these organizations – such as Global Reporting Initiative (GRI), Integrated Reporting (IIRC), United Nations (UN), SASB and others – offer approaches that do not represent mandatory regulations and that are not generally accepted as the financial reporting principle issued by the IASB or FASB are (Eccles et al., 2012).

Some examples of the most notable materiality definitions are the following.

The Integrated Reporting defines a matter as material

*“if it could substantively affect the organization’s ability to create value in the short, medium or long term.”<sup>7</sup>*

The Sustainability Accounting Standard Board (SASB) defines materiality in the same way as the U.S. Supreme Court:

*“a fact is material if there is a substantial likelihood that the disclosure of the omitted fact would have been viewed by the reasonable investor as having significantly altered the ‘total mix’ of the information made available.”<sup>8</sup>*

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<sup>7</sup> Integrated Reporting, Materiality in <IR>.

<sup>8</sup> U.S. Supreme Court

The Global Reporting Initiative defines materiality as:

*“...aspects that: Reflect the organization’s significant economic, environmental and social impacts; or Substantively influence the assessments and decisions of stakeholders [...] Relevant topics are those that may reasonably be considered important for reflecting the organization’s economic, environmental and social impacts, or influencing the decisions of stakeholders.”<sup>9</sup>*

One could note that SASB addresses materiality referring to fact relevant from the point of view of the investors while the GRI is more oriented towards the disclosure of information for all the stakeholders.

Freedom of choice is left to companies, which can choose the guideline/framework they prefer, thus leaving space for subjectivity, malleability (Edgley, 2014), and a lack of standardization with a consequent difficulty in the comparability of companies’ non-financial information.

This section will firstly review some general studies about the role and characteristics of materiality in the non-financial disclosure and, secondly, it will cover papers suggesting different methods to help companies in identifying material issues to their business.

### **2.2.1 General aspects**

It is common sense that the relevance of non-financial issues varies across different sectors. For instance, CO<sub>2</sub> emissions would have a stronger impact on the activity of companies in the industrial sector rather than on those in the financial industry.

Coherently with this intuition, Eccles and colleagues (2012) argue that materiality must be defined on a sector-specific basis. Particularly, their idea is that within a given industry similar disclosures should be expected since sustainable aspects that are material to one company would be relevant to all the companies in that same industry, even though potentially to a different extent depending on a company’s strategy.

In their research, they consider a sample of 6 industries based on available 10-K SEC filings in 2011 – the first year since the SEC issued a guidance on climate change (see paragraph

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<sup>9</sup> GRI Standards, Defining Materiality: What Matters to Reporters and Investors

*Regulations outside the EU* in the chapter *Regulation and reporting frameworks*) – and by comparing them they find a wide variation in disclosure practices. This demonstrates that, from industry to industry, materiality perception is different.

However, when they move from industry comparison to single industry analysis, focusing on airline and utilities, they obtain mixed results. In the airline industry 100% of sample companies recognize fuel hedging as material and disclose related quantitative metrics, but regarding other variables, it cannot be said the same thing. For the utilities sector there is not even one single variable on which all companies disclose quantitative metrics; however, for each of the six variables, at least one company is providing quantitative metrics, demonstrating that quantitative disclosures are possible.

Eccles and colleagues (2012) conclude that even if each sector has different material issues, companies within the same sector are still not disclosing non-financial material information in a comparable format.

Starting from the understanding that it is difficult for a company to improve its ESG performance without damaging the financial one, Eccles and Serafeim (2013) study the trade-off between the two aspects and propose a framework to help companies developing a sustainable strategy. According to their definition, a sustainable strategy should boost the ESG performance not coming at a cost to the financial results: companies willing to implement a sustainable strategy need to focus on the most material ESG issues and produce major innovations in products or services that prioritize those material matters.

In their research, the two authors identify four initiatives that should be followed to create the sustainable strategy: the first one, *“Identify material ESG issues”*, is quite relevant for my review of literature about materiality. Indeed, Eccles and Serafeim argue that, even if the set of ESG factors that can have an impact on a company financial performance is wide, firms should identify only those issues that significantly affect their ability to create long term shareholders’ value. Organizations should consider the sector in which they operate and the strategy they are pursuing to understand which ESG issues truly matter. They argue that not all ESG issues arise with the same frequency in all industries and the intensity of the impact on firm financials can be different.

Therefore, in their framework, the authors suggest that companies use the SASB Materiality Map™ to identify the most critical ESG issues for them. A possible reason of the need for sector specific guidelines for material non-financial reporting has been identified by Edgley

and colleagues (2014) in a series of interviews they conducted back in 2006-2007 with 12 non-accounting UK assessor organizations and 8 accounting assessors from accounting firms. The aim of the interviews was to investigate the role and meaning of materiality in social and environmental reporting (SER) and SER assurance (SERA). According to their study, there is evidence of a strong association between ethical issues and materiality, making the latter a sort of critical lens useful to check that SER disclosures provide a full view of the responsible corporate conduct. The authors argue that this vision of materiality enhances the need for inclusion of different key areas of performance from sector to sector.

Another key finding of this research is that interviewed assessors consider materiality not only with a historical focus but also as a forward-looking tool. In fact, besides helping in reporting past data, the principle of materiality can be functional to filter forward-looking information in order to anticipate important future issues that could affect stakeholders. The importance of having material aspects defined on an industry basis is demonstrated also by Khan and colleagues (2015), who analyse different firms' performances on sustainability issues in relation to firms' stock returns. Particularly, they define the material sustainable aspects for each analysed sector by using the SASB guidelines, while to evaluate firm's performance on the identified sustainability matters they use data provided by MSCI KLD. They manage to demonstrate that - on the time horizon going from 1993 to 2013 - companies with higher performance on material sustainability issues outperform companies with inferior performance on material sustainability issues. In other words, Khan and colleagues (2015) show that investments in material sustainability issues can create value for shareholders.

Another relevant finding was that companies with good performance on non-material sustainability aspects do not underperform companies with poor performance on non-material topics, demonstrating that investments in non-material sustainable topics are at minimum non-shareholder value-destroying.

### **2.2.2 Identifying material issues**

Once acknowledged the importance of identifying sustainability related issues that are truly relevant to a company and to its stakeholders, it comes natural wondering how this might be done.

Wu and colleagues (2018) propose some screening methods to assess materiality using publicly available resources. A first approach is based on the use of the SASB Materiality Map™, an online interactive tool, that, for each sector and industry defines the sustainable issues that are likely to be material for less or more of the 50% of the industries in that sector or companies in that industry.

A second suggested approach is the GRI Sector Disclosure which consists in some key indicators tailored for ten industries (for further details see paragraph *Reporting Standards*). A final approach, which is a desktop research, leverages the existence of the GRI Sustainability Disclosure Database where almost 57,000 (as of end of November 2019) sustainability reports are present, coming from about 14,000 companies. Therefore, Wu and colleagues suggest one could use this database as a screening method to look for sustainable reports made by same sector, same market and same scale organizations to see which topics they are considering as material.

Starting from the observation that only few studies have researched in the field of quantitative methods to assess the level of materiality of non-financial information, Calabrese et al. (2016) develop a “fuzzy analytic hierarchy process” method.

The idea behind their methodology is to offer a way to prioritize sustainability aspects helping companies in identifying the content they should disclose, since not all aspects of sustainability have the same relevance for every company because of the impact of organizational characteristics (Murillo and Lozano, 2006; Roberts et al., 2006).

The fuzzy AHP works by asking to decision or report makers to compare the relevance of GRI aspects and indicators, in pair-wise comparisons. The decision makers judge the relative importance of the items, pair by pair, using a linguistic scale composed by five levels: equally, weakly more, moderately more, strongly more or extremely more important. The linguistic judgments are then converted into triangular fuzzy numbers organized in fuzzy comparison matrices on which a series of mathematical transformations are applied. The result of the model is numerical weights for the GRI aspects that can therefore be prioritized in terms of material sustainability.

Another quantitative method has been developed by Hsu and colleagues (2013). They use failure modes and effects analysis (FMEA) to create a model to determine material issues for a Taiwanese company, Lite-On Technology Corporation. Particularly, it employs three FMEA indices: occurrence, coming from the percentage of concerned stakeholders; detection,

referring to the level of concern among stakeholders; and severity, which can be quantified from the impact of issues on the strategic communication objective. Then, an analytic network process (ANP) – a more general form of analytic hierarchy process (AHP) - is applied to determine the relative weights of the three indices. The now-prioritized three indices can be used to identify the sustainability related material issues.

The aforementioned methods can be very useful for large-sized companies but, according to Spence and Lozano (2000), small-medium enterprises (SMEs) are less likely to adopt the existing international standard frameworks or to use quantitative approaches because of a lack of resources, time and specialized knowledge and because the related benefits could be outweighed by the costs of implementation (Borga et al., 2009).

For SMEs there are other methods that can be applied to evaluate and prioritize the materiality of sustainability issues.

Arena and Azzone (2012), for example, propose a general process for identifying a set of material GRI-inspired key sustainability indicators (KSI) tailored for SMEs. The process is based on four steps.

At first, a competitive analysis is carried out to identify the key sustainability issues relevant for the sector in which the SME operates: this assessment should be made by third-party management experts.

The second step consists in a process and technology analysis, made by third-party technology experts who should identify the key processes and the technologies characterizing the industry. The key processes should then be crossed with the key sustainability issues (i.e. those identified in the first step) in order to see whether the SME can improve that specific sustainability issue by working on that process.

The third step is the creation of a preliminary set of KSIs. For each couple of processes and key sustainable issues, the SME should ask to the third-party technology experts some KSIs, that should be provided with a detailed description of their purpose and of their measurement.

The final step is a cost/benefit analysis with which the SME decides if the suggested KSIs can be measured in a reliable and affordable way.

Once the process is completed, the SME should have a complete set of indicators to measure the sustainable issues material to its business.

Similarly, Muñoz Torres et al. (2012), starting from the observation that 99% of Spanish companies are SMEs and that the majority of international CSR standards are not perfectly suitable for SMES, propose a model to help smaller organizations in identifying basic corporate social responsibility material aspects.

The model has been developed through a three-step process: at first, main CSR issues that could affect a company are identified through literature review and interviews with experts. Then, a telephone survey is made with 500 Spanish SMEs to check that the issues identified in the previous step are truly relevant. Finally, leveraging survey results, the final model with 39 material CSR issues for the Spanish SMEs is drawn.

Borga et al. (2009) specifically design guidelines for Italian SMEs as well. To do this, the methodology adopted is the one of the case study: multiple case studies are carried out on seven Italian SMEs to test the guidelines designed starting from already existing national and international frameworks. The final guidelines consist of a set of indicators simplified to better represent the condition of smaller enterprises.

## **2.3 Evaluation of non-financial disclosure**

Every study that aims at understanding the determinants or the effects of better non-financial disclosure (NFD) must first address a preliminary and crucial point: what does “better” mean? The definition of a score to evaluate NFD, and thus the methodology and principles followed to compute such score, is a key point and a most debated one.

Authors proposed different approaches, often leading to different and contradictory results when assessing determinants and consequences of NFD (Hummel and Schlick, 2016; Urquiza et al., 2009).

Broadly, studies can be divided into three categories, depending on the different aspects of the non-financial disclosure which they aim to study (Hahn and Kühnen, 2013):

- Studies focusing on the determinants of the adoption of sustainability reporting.
- Studies focusing on the determinants of the extent of the non-financial disclosure.
- Studies focusing on the determinants of the quality of non-financial disclosure.

These categories correspond to different approaches to the analysis of non-financial disclosures and to different definitions of NFD scores.

Based on the analysed dimension of the non-financial disclosure, also the results of the studies differ.

An important aspect of all disclosure studies, as explicitly pointed out by Donnelly and Mulcahy (2008), is that results may be affected by the disclosure score used (Abad et al. 2008; Urquiza et al. 2009; Artiach and Clarkson, 2011).

Artiach and Clarkson (2011) well summarize this issue: *“different disclosure indices often develop within different studies that address relatively similar issues because there is no agreed upon theory to guide the choice or number of items to include within the index.”*

However, the literature on the effects of different disclosure indices on the results of disclosure studies is limited.

Urquiza and colleagues (2009), for example, highlight how there is no consensus around the best design for disclosure indices and empirically show that, although different indices are correlated, they have a large impact on the ranking of companies. Therefore, the results of disclosure studies may be affected by the construction of the disclosure index. They distinguish between quality indices, scope indices and quantity indices.

- Quality indexes are those that try to directly measure the quality of disclosure assuming a multidimensional perspective (e.g. see the approach developed by Beretta and Bozzolan, 2008).
- Quantity indexes are those based on the amount of information disclosed, often evaluated through number of sentences or words included in the reports.
- Coverage or scope indices, on the other hand, define a set of information and evaluate the disclosure in terms of each item using a dummy variable (value of 1 if information is disclosed, 0 otherwise). This approach appears to be the most widely used, especially in non-financial disclosure evaluation.

A version of this last methodology is the one used in my study and will be described in the chapter *Disclosure score and univariate analysis* under the paragraph *Non-financial disclosure score design*.

Scope/Coverage indices are often modified to give a higher value or weight if the information is disclosed in quantitative terms or comparable data with respect to competitors or previous years are provided. The rationale is to better capture the quality of disclosure, under the assumption that more quantitative and less “generic” statements define a better quality of the information. While this is probably the case, as Urquiza et al. (2009) point out, there is no



consensus around the benefits of weighting items, also due to the subjectivity that weighting might introduce.

While a higher number of sentences or disclosed items are not necessarily a sign of higher quality of disclosure, the correlation found between different measures leads to conclude that quantity or scope can be used as proxies of quality (Urquiza et al. 2009).

On the other hand, Beretta and Bozzolan (2008) argue that quantity of disclosure is not a sound proxy for quality of disclosure. In the end, since different indices lead to different rankings, the choice of the score methodology should be made based on the different aspect of disclosure that one wants to evaluate.

Since the objective here is trying to capture the coverage of non-financial disclosures taking into account the new regulatory framework and the recognized differences in material aspects between sectors, this choice has potentially a large impact on the results of my analysis, as will be discussed in the Conclusions, Limitations and future research chapter.

## **2.4 Determinants of non-financial disclosure**

The following section aims at giving an overview over the extant literature on the determinants of non-financial disclosures, highlighting:

- the main theories behind the different hypothesis to explain sustainability disclosures;
- the main determinants of non-financial disclosures that have been studied considering these theories and the results of these studies. I will focus on the determinants which will be the object of the analysis, specifically: ESG performance, ownership structure and corporate governance variables.

### **2.4.1 Relation between sustainability performance and sustainability**

#### **disclosure: voluntary disclosure theory and legitimacy theory**

Two of the most relevant theories studied in the extant literature to explain the relation between ESG performance and ESG disclosure are voluntary disclosure theory (Verrecchia 1983; Dye 1985) and legitimacy theory (Deegan, 2002).

The voluntary disclosure theory forecasts a positive relation between ESG performance and ESG disclosure as better performers disclose more information to signal their superior performance. The theory developed by Verrecchia (1983) in relation to discretionary

disclosure posits the existence of a “threshold level of disclosure”, chosen by the manager, below which a manager withholds information and above which he discloses information. This information is a signal which influences the value of the asset of which the manager is in charge. Since the value depends on traders’ expectations, the threshold level of disclosure is also determined based on trader’s expectations.

The theory is based on two aspects: firstly, the signalling effect of disclosure, which is the idea that *“the possessor of superior information or insight will signal what he knows either directly or through his actions to achieve some economic benefit”*; secondly, the existence of costs related to disclosure of information that may be potentially damaging due to their proprietary nature, i.e. the existence of a proprietary cost. Verrecchia observes that this cost may be high regardless of whether the information is favourable or not.

If the manager does not disclose the information, this has a signalling effect on the value of the asset, but if he discloses, the value of the asset is reduced by the proprietary cost. Therefore, information may be withheld either because it is unfavourable or because it is favourable but not enough to compensate for the proprietary cost that will be incurred by disclosing.

While the author does not discuss non-financial disclosures, the reasonable consequence of this theory in the context of my analysis is that, all else being equal, in the presence of proprietary costs, the better the ESG performance, the more the firm will disclose, as the favourable information will compensate for the proprietary costs of disclosing it.

On the other hand, the lower the performance, the less the firm will disclose, as, below a certain threshold, not disclosing will only signal a performance below the disclosing threshold, but neither too unfavourable nor too favourable.

Dye (1985) argues that even when information is of non-proprietary nature, and thus its disclosure does not lead to proprietary costs, there are reasons why managers may withhold this information, among which the fact that investors may be unaware of the information and thus managers may be able to avoid disclosing unfavourable information.

Legitimacy theory expects the opposite: a negative relation between ESG performance and ESG disclosure, as poor performers try to “legitimate” their condition to stakeholders by disclosing more. The legitimacy theory is based upon the notion of the existence of a “social contract”. As stated by Shocker and Sethi (1973):

*Any social institution - and business is no exception - operates in society via a social contract, expressed or implied, whereby its survival and growth are based on:*

- *the delivery of some socially desirable ends to society in general, and*
- *the distribution of economic, social, or political benefits to groups from which it derives its power.*

*In a dynamic society, neither the sources of institutional power nor the needs for its services are permanent. Therefore, an institution must constantly meet the twin tests of legitimacy and relevance by demonstrating that society requires its services and that the groups benefiting from its rewards have society's approval.*

The underlying idea is that no organization has an inherent right to exist. They exist as long as the society considers them to be legitimate. If the society perceives that the organization has broken the social contract, its very existence may be challenged. Furthermore, what is considered acceptable by society, and thus legitimate, might change over time (Deegan, 2002).

Since the theory is based on perceptions, any managerial strategy, to be effective in affecting legitimacy, must be communicated through disclosure (Cormier and Gordon, 2001).

Lindblom (1994) identifies four ways in which communication through disclosure can be used to restore or maintain legitimacy: either communicate actual changes or change/manipulate the perceptions or expectations.

Deegan (2002) summarizes well the outcome of legitimacy theory as “*managers will only provide disclosures when people have concerns which threaten legitimacy*”. He argues that literature should work to show regulators evidence that leaving the choice to disclose to managers leads to biased information.

The legitimacy theory belongs to the so called “socio-political theories”, together with stakeholder theory and political-economy theory: these theories are partly overlapping, as they all assume that non-financial disclosure is a function of social and political pressures (Patten, 2002; Deegan, 2002).

Voluntary disclosure theory and legitimacy theory have usually been considered as two conflicting views.

Evidence on the positive association between ESG performance and ESG disclosure, thus on voluntary disclosure theory, is given, for instance, by Al-Tuwajiri et al. (2004). The research

finds a significant positive relation between environmental performance and both economic performance and extent of “*quantifiable environmental disclosure*”. The authors contend that the mixed results in previous literature regarding the relation between economic performance, environmental performance and environmental disclosure derives from not considering these variables jointly but only assessing the relation between two of the three variables. Two-stage least squares and three stage least squares models are used to evaluate the joint relation between the variables.

A more recent study by Rezaee (2017) also gives evidence of a positive relation between sustainability performance and non-financial disclosures, distinguishing between forward-looking and historical non-financial information. Specifically, using a sample of 580 US firms, the author builds a non-financial disclosure score and both forward looking and historical scores, taking quantity and quality of information into account. Sustainability performance is evaluated using the KLD database<sup>10</sup>. He finds a positive relation between better future sustainability performance and forward looking non-financial disclosure score and between current year sustainability performance and historical non-financial disclosure score.

On the other hand, Cho and Patten (2007), find evidence for the legitimacy theory. The authors argue that the lack of consistent results for the relation between environmental performance and disclosure depends on the disclosure metrics used. Therefore, following on the work from Patten (2002), they distinguish between litigation related and non-litigation related disclosure, arguing that only the latter should be included when analysing disclosure as a legitimizing tactic, since litigation disclosures tend to be more negative and less discretionary and thus, according to Patten (2002), not useful as a legitimizing tool. Furthermore, they distinguish between monetary and non-monetary disclosures and contend that in environmentally sensitive industries, companies already have incentives for disclosure beyond their environmental performance, as they are more exposed to the “*public policy process*”.

On the other hand, companies in non-environmentally sensitive industries do not face the same kind of exposure, and thus it is poor environmental performance that creates the need for non-monetary disclosure as a legitimizing tool. Companies in environmentally sensitive

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<sup>10</sup> Kinder, Lydenberg, Domini was the leading authority on social research for institutional investors, now merged into MSCI (Morgan Stanley Capital International).

industries will see legitimizing benefits from the use of monetary environmental disclosure, which the authors expect to be higher for worse performers in these industries.

They find evidence in favour of all these hypotheses, thus providing evidence that companies *“appear to use financial report environmental disclosures as a legitimizing tool”* An interesting perspective on legitimacy theory is assumed by De Villiers and Van Staden (2006). They argue that *“legitimising objectives may also be served by changing the type (general/specific) or reducing the volume of environmental disclosures”*.

Focusing on South African companies, the authors carry a content analysis of the annual reports of 140 industrial and mining companies over a period of 9 years.

They find that publication of both specific and general information increased over the period 1994 to 1999 but then declined, especially specific information. This downward trend is explained, according to the authors, by changes in the socio-political context, making environmental issues less important. As a result, they argue that companies will avoid specific disclosures since they perceive that they are not required anymore and may even be damaged by attracting *“unwanted scrutiny”*. On the other hand, they will continue to disclose generic information, which is *“symbolic”*, less costly and unlikely to attract further attention.

Cho et al. (2012) studied the alignment between environmental performance and perception of environmental reputation of a company. They find a negative relation between environmental performance and both reputation and membership to DJSI<sup>11</sup>, while they find a positive association between voluntary environmental disclosure and reputation and membership to DJSI. This leads the authors to conclude that both environmental reputation and membership to DJSI are more a consequence of what companies say through their environmental disclosure than their actual performance. The sample is based on 92 US firms from environmental sensitive industries. Clarkson et al. (2011) find some evidence in favour of socio-political theories, but evidence against both voluntary disclosure and legitimacy theory in the analysis of the *“quality”* of non-financial disclosure. Specifically, by using a sample of 51 Australian firms and a disclosure index based on GRI guidelines and developed by Clarkson et al. (2008), the authors find a significant and negative association between environmental performance and disclosure (firms with greater emissions make more environmental disclosures).

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<sup>11</sup> Dow Jones Sustainability Indices, are a family of indices evaluating the sustainability performance of thousands of companies.

However, they also find a significant and negative association between environmental performance and hard, objective disclosures. This last result goes against both the voluntary disclosure and legitimacy theories, that would predict firms with worse environmental performance to make use of generic, qualitative and less verifiable disclosures.

This leads the authors to conclude that *“both the level and nature of environmental disclosure provided by a firm may not be indicative of its underlying environmental performance”* and call for improved mandatory requirements. The authors also suggest that future research on non-financial disclosure may want to focus on internal variables as drivers of disclosure, since firms’ disclosure strategies may be more influenced by these factors rather than by the attempt to distinguish themselves from competitors, as it would be suggested by voluntary disclosure theory.

Hahn and Kühnen (2013), in their review of extant literature, state that *“research points to a significant but ambiguous effect of social and environmental performance on reporting activities”*.

Some authors have tried to go beyond the conflict between the two theories, trying to use them together.

For example, Clarkson et al. (2008), give evidence in favour of the voluntary disclosure theory while simultaneously referring to legitimacy theory. The study finds a positive relation between environmental performance and the extent of discretionary disclosure in environmental and social reports. The sample is made of 191 firms from the five most polluting industries in the US.

NFD is evaluated using a content analysis index based on the GRI. Specifically, the author uses 95 line-items divided into 7 categories containing *“hard”* (objective) and *“soft”* disclosures, built to reflect the spirit of the GRI framework, to evaluate non-financial disclosures.

However, the author also refers to legitimacy theory to explain *“interesting patterns in the data”* and calls for future research to explore the possibility of the concurrent application of both theories. It should be highlighted that the study, like most papers analysed, is carried under the assumption of voluntary disclosure. The author states that *“The voluntary decision by a firm to both prepare a social responsibility report and use the GRI guidelines means that the firm has opted for a format (the GRI format) that, by the intent of the GRI guidelines, will result in hard disclosures not easily mimicked by the poor EP (environmental performance) types.”*

The voluntary nature of non-financial disclosure is an assumption which is not anymore in place in the context of my research, and GRI has now become the standard for sustainability reporting (KPMG, 2017).

Hummel and Schlick (2016) pick up on the intuition suggested by Clarkson and argue that voluntary disclosure theory and legitimacy theory are not opposed, as seen by most previous literature. They find that voluntary theory explains the higher quality of non-financial disclosure by companies with higher ESG performances, since they use quantitative, hard, indicators to prove their superior performance, something poor performers cannot do.

On the other hand, legitimacy theory explains the larger extent of disclosure of soft, qualitative non-financial data by companies with lower ESG performances, as they try to legitimate their position through wide, but generic, disclosures. They find a positive relation between high quality disclosure and ESG performance and a negative relation between low quality disclosure and ESG performance.

A similar result is found by Broadstock and colleagues (2019). They provide evidence of the *“effect of corporate choices on environmental, social, and governance (ESG) strategic investment compliance (i.e., doing good) to firms' eco-efficiency levels (doing well)”* (eco-efficiency levels here are a proxy of the Environmental score).

Their empirical findings suggest that ESG and firm's eco-performance are nonlinearly related. Specifically, advanced ESG policies and disclosure levels are associated with a positive effect to firms' eco-efficiency levels, but only up to a point, after which the effect becomes “neutral”, i.e. ESG demonstrates a visible pattern of diminishing marginal returns. Thus, the authors conclude that *“a firm may “do well” by doing good, but it is not clear they should ever expect to “do great” just by “doing good.”*” They also state that the threshold at which this “neutrality” appears varies systematically with the characteristics of the sector in which the company operates, as well as dimensions of board diversity.

#### **2.4.2 Ownership structure**

The expected relation between ownership concentration and disclosure derives from agency theory (Jensen and Meckling, 1976), which suggests that when there is separation between ownership and control of a firm, agency costs arise due to conflicting interests between principals (owners) and agents (managers).

When ownership is more fragmented, Fama and Jensen (1983) argue that the potential for conflicts is higher, which in turn is likely to lead to greater information disclosure so that principals can more effectively monitor that their interests are being pursued and agents can signal that they are acting in the interest of owners. It should be noted that most literature is focused on voluntary disclosure, not specifically on non-financial disclosure.

Several ownership variables have been studied in relation to non-financial disclosure.

Listed companies are expected to be more transparent, and thus engage in more reporting, either as a consequence of regulation, pressure from stakeholders, or need to channel information to shareholders. This last aspect is expected to be particularly true for companies with more dispersed ownership, as there is more need to reduce information asymmetries. Indeed, concentrated ownership can be considered an obstacle to sustainability reporting as large shareholders are expected to already have access to this information through other channels.

Hahn and Kühnen (2013) analysis of extant literature on this relation reports of mixed evidence. Some studies find a negative relation between the concentration of ownership and non-financial disclosure, while some others find no significance.

Fatemi et al. (2017), in their study of the relation between ESG performance, ESG disclosure and firm value, use ownership concentration as an instrumental variable finding a negative and significant correlation between ESG disclosure and the share of ownership of the single largest investor.

A study by Eng and Mak (2003) is one of the few that tries to establish a link between voluntary disclosure and government ownership, starting from the assumption that state-owned companies need greater disclosure since they face higher agency costs and weaker governance. The study is not solely focused on non-financial information, as both financial and non-financial (voluntary) disclosures are considered in the measurement of voluntary disclosure. They find that government ownership is associated with a higher level of voluntary disclosure. This is consistent with arguments that, as stated by the authors, *“government ownership increases moral hazard and agency problems, and disclosure is a mean of mitigating these problems”*.

The authors also find a negative relation with managerial ownership, as they forecasted, given that low managerial ownership is expected to lead to higher need for monitoring.



On the other hand, in contrast with the authors' hypothesis of a negative relation (similarly to managerial ownership, as diffused ownership is expected to increase monitoring needs), no correlation is found with the share of block-holders, defined as the share of ownership belonging to shareholders with more than 5% of shares.

Said et al. (2009) find government ownership to significantly and positively influence the extent of CSR disclosure by Malaysian firms. On the other hand, no association was found with managerial ownership, foreign ownership and ownership concentration.

Similar evidence from Tagesson et al. (2009) finds that state owned corporations disclose more social information on their websites compared to privately owned corporations.

No correlation between ownership structure and non-financial disclosure is found by Prado-Lorenzo et al. (2009) in their study of Spanish companies. The research finds a significant positive relation only between the existence of a dominant shareholder and the adoption of the GRI standards, while the presence of financial institutions in the capital of the company and the dispersion of ownership (proxied by the number of independent directors in the board, which are assumed to defend the interests of minority shareholders) are found to have no influence.

Chau and Gray (2002), in their study of companies listed in Hong Kong and Singapore, find that the extent of voluntary disclosure (not only sustainability related), defined as "*disclosures in excess of requirements*", is positively related to dispersed ownership, proxied by the extent of outside ownership, which is defined as the percentage of shares not owned by directors and dominant shareholders. In the Hong Kong and Singapore settings, family ownership is very common, which, according to the authors, leads to lower levels of voluntary disclosures compared to the US and UK.

In their analysis of reports for year 2002 by 559 Chinese firms listed on the Shanghai Stock Exchange, Huafang and Jiaguo (2007) find that higher block-holder ownership is related with a higher level of voluntary disclosure. The same effect is found for foreign ownership, while no relation is found with managerial ownership, state ownership and legal-person ownership. In a research on Malaysian firms Ghazali (2007) finds a lower level of CSR disclosure in owner-managed companies, that is, companies where directors hold a higher share of equity, while firms disclosed more CSR information when government is a large shareholder, coherently with the findings from Eng and Mak (2003).

On the other hand, Donnelly and Mulcahy (2008) do not find any evidence in favour of the relation between ownership structure and voluntary disclosure in Ireland. Both the variables tested, institutional ownership and managerial ownership, are found to be non-significant, while a significant positive association with board independence is found. The authors recognize that country specificities, in particular organizational and sociological factors, are potentially relevant aspects that influence results. In the Irish case, the authors point to the relevance of *"informal networks"* and the ensuing leakage of information through informal channels, that in turn affects the relation between institutional ownership and disclosure. The same type of cultural influence was noted by Chau and Gray (2002) and Huafang and Jiaguo (2007) in their study of Asian firms. These papers note how the Chinese society is characterized by high levels of collectivism, power distance and uncertainty avoidance. These societal values, according to the authors, would result in people tending to adhere to rules and voluntarily disclose less information compared to US and UK. In other words, *"Chinese culture in itself does not promote voluntary disclosure of corporate information"* (Huafang and Jiaguo, 2007).

García-Meca and Sánchez-Ballesta (2010) reviewed 19 studies on the relationship between voluntary disclosure and ownership concentration finding a negative relation.

Khlif et al. (2017) provide a good meta-analysis of empirical studies on the relation between ownership structure more generally (not only considering ownership concentration) and voluntary disclosure.

The analysis covers 69 empirical studies and finds that government, institutional and foreign ownership are positively associated to voluntary disclosure, while managerial ownership and ownership concentration have negative effects.

The assumed negative relation between ownership concentration and disclosure derives from agency theory, as previously described.

On the other hand, institutional ownership is assumed to have a positive association with voluntary disclosure, since institutional investors, as outsiders, may not be able to directly oversee managers and thus demand more voluntary disclosures (Ajinkya et al. 2005).

Furthermore, there is also an inverse relation, as funds prefer to buy shares in firms that have greater transparency standards and thus firms may increase disclosure prior to raising new capital (Bushee and Noe, 2000; Firth, 1980). However, there are also contrasting views.

Laidroo (2009) points out that when institutional ownership is high, these investors may have direct access to information, reducing the need to disseminate information.

Foreign ownership can also be posited to be positively associated to voluntary disclosure, as foreign investors face higher levels of information asymmetries (Huafang and Jinguao, 2007). On the other hand, the relation with state ownership is harder to define, as there is no theoretical consensus in the literature about the relation. The presence of the government may reduce external dependencies of the firm, that thus has less incentives to make voluntary disclosures (Khlif et al., 2017). Furthermore, state owners may seek objectives different from profitability and efficiency, or may have direct access to inside information, reducing the pressure for disclosures directed at the public (Wang et al. 2008; Xiao et al., 2004).

In general, agency theory, resource dependence theory, and property rights theory would suggest a negative relation between state ownership and voluntary disclosure due to lack of incentives for managers to disclose in state-owned companies (Khlif et al., 2017). Conversely, Government may put pressure on firms to disclose more social and environmental information to improve the perceptions of firms in which it has a significant participation (Naser et al. 2006). This is the view of legitimacy theory (and stakeholder theories), which posits a positive relation between state ownership and voluntary disclosure. Most studies have used this perspective in assessing the relation (Khlif et al., 2017). Furthermore, Wang et al. (2008) argue that state-owned enterprises are also likely to be faced with greater adverse selection and moral hazard problems, leading to higher incentives for voluntary disclosure in order to *“ease investor concerns regarding management quality, the potential for asset stripping or misappropriation, and the role of the government as a major shareholder”*.

Khlif et al. (2017), recognizing the inconsistency in the literature in findings regarding the association between ownership variables and voluntary disclosure, use meta-analysis techniques to determine whether this heterogeneity of results can be attributed to some factors, referred to as moderating factors, or it is just “random errors”. Specifically, they focus on two country-specific moderating factors (investor protection and level of market development) and researcher-induced factors (measurement of disclosure index, publication quality and measurement of explanatory variables).

They expect the negative relation between ownership concentration and disclosure to be greater in settings of low market development and low investor protection, since these features increase the power of concentrated owners that may become more entrenched and

extract information from management for private benefits, while in more developed markets minority shareholders will be more protected by law and market forces. In less developed markets, the use of voluntary disclosure to attract funds is also less relevant.

They find a low level of market development to make the association greater, while they find that different levels of investor protection do not moderate the association.

Conversely, the association of voluntary disclosure and state ownership is found to be positive and greater in both high investor protection and high market development countries. A possible explanation, in agreement with legitimacy theory, is that in developed capital market countries, where there is a high level of corporate disclosure (due to competition), firms with substantial state ownership are incentivized to match their private competitors in mitigating reputational loss (Khlif et al. 2017).

The importance of information asymmetries, and the need to reduce them as a driver for non-financial disclosure is testified also by the adoption of some measures of information asymmetry as control variables in various studies. Clarkson et al. (2008) for instance, use Tobin's Q and stock price volatility as indicators of information asymmetries but find both to be non-significant in influencing disclosure.

### **2.4.3 Corporate governance**

Corporate governance variables are among the most widely studied in relation to non-financial and voluntary disclosures. These variables are often studied together with ownership variables due to their connections. Among the most widely studied factors are CEO duality, board size, board independence, board gender diversity and the presence of a CSR committee.

One of the most cited study on the relation between corporate governance variables and voluntary disclosure in general is the one by Eng and Mak (2003). The research, which also analyses ownership variables, finds that an increase in outside directors reduces the level of voluntary disclosure. The result is in contrast with the authors' hypothesis of a positive association, which derives from prior literature (for instance, Chen and Jaggi (2000) found a positive association, although the authors focused on financial disclosure) and from the theoretical reasoning that outside directors are less aligned to management and thus may be more willing to encourage firms to disclose more.

The negative relation may be due to outside directors acting as a substitute for monitoring through public disclosure (Eng and Mak, 2003).

A study by Tamimi and Sebastianelli (2017) finds that companies with larger board sizes, more gender diverse boards, that allow CEO duality and that have incentives at executive level for ESG performance have higher ESG disclosure scores. The sample of this study is made of S&P 500 companies and the disclosure is evaluated through the Bloomberg ESG disclosure score. Interestingly, the authors find differences in the transparency across the 3 main ESG areas, with Governance being the one with the highest level, while the lowest transparency is found on Environmental issues.

In their study of Chinese companies, Huafang and Jianguo (2007) find an increase in independent directors to increase corporate voluntary disclosure while CEO duality to be associated with lower disclosure.

A lower level of voluntary corporate disclosure in presence of CEO duality is also found by Gul and Leung (2004) in their study of 385 Hong Kong firms. However, the authors also find that the negative association is weaker for firms with a higher proportion of independent experienced directors in the board, suggesting that the relation is moderated by the expertise of non-executive directors.

Donnelly and Mulcahy (2008) also find some evidence of a positive influence of a nonexecutive Chairman on the voluntary disclosure of Irish firms. In general, disclosure is found to increase with the number of non-executive directors in the board.

They also find a positive association with board size, but this may be explained by the strong correlation of this variable with the firm size.

The assumed relation between CEO duality and disclosure is grounded, again, in agency theory.

As Fama and Jensen (1983) point out, CEO duality may limit board's ability to monitor management and thus increase agency cost, as there is no separation between decision management and control. This concentration of decision-making power would constraint board independence and monitoring effectiveness and thus prove detrimental to voluntary disclosure (Ho and Wong, 2001; Gul and Leung, 2004; Allegrini and Greco, 2013).

The negative relation between CEO duality and voluntary disclosure reinforces the findings from Forker (1992) of a significant negative relation between the existence of a dominant personality and disclosure quality.

On the other hand, Ho and Wong (2011) find no significance for the association of CEO duality and voluntary disclosure, contrary to their hypothesis. They argue that this may be due to country specificities: the study is focused on Hong Kong firms where if a person is both chairman and CEO he is also likely to be a major shareholder. In that case, it would not matter whether the positions are separated or not. No significance is found also for Malaysian firms by Said et al. (2009).

Also Ismail and Latiff (2019) studied Malaysian companies, analysing the relationship of board diversity on firms' sustainability practices. They found that age and board capabilities are positively associated with firms' sustainability practices. In contrast, women directors and independent directors are negatively related with sustainability practices.

An interesting study by Fasan and Mio (2017) analysed the disclosure of materiality (defined as "the extent to which companies disclose the materiality determination process") among a sample of companies that participated in the IIRC Pilot Program. They find that board size and gender diversity are significant determinants of materiality disclosure. Specifically, they both have a negative effect. The negative association between materiality disclosure and board size is consistent with a *"conflicting vision of the materiality determination process, in which different stakeholders compete to have their issues classified as material"*. The larger the board size, the harder it will be for the members to find an agreement.

Ismail and Imran (2019), who analysed disclosure across 86 firms in Pakistan Stock Exchange from 2010 to 2017, find instead a positive effect for gender diversity.

Samaha et al. (2015) find that, while board size and board composition have a significant positive effect on voluntary disclosure, while CEO duality has a significant negative impact. Additionally, geographic location moderates the association between board size, board composition, CEO duality and voluntary disclosure.

Husted and Sousa-Filho (2019) analysed Latin America firms and found that board size and independent directors impact ESG disclosure positively, while with women on the board and CEO duality a negative relation is found.

Lagasio and Cucari (2019) provide *"to the best of the authors' knowledge, the first meta-analysis of evidence about the influence of the corporate governance on environmental, social, and governance (ESG) disclosure"*. They apply meta-analysis to a sample of 24 empirical studies to clarify the relationship of board size, board independence, women on board, CEO duality, and company ownership with ESG disclosure. The results show that board

independence, board size, and women directorship visibly enhance ESG disclosure; company ownership and CEO duality do not improve the level of ESG disclosure.

Ismail and Imran (2019) add something else. They also investigate the effect of board diversity on quality of corporate social responsibility. This time, however, the study considers, among other variables, also board tenure (i.e. how much time each board members stays in place). The authors find a positive relation between this variable and the sustainability disclosure. It could be interesting to go more into detail about this variable, not analysed very often in the literature with relation to sustainability disclosure. A high tenure could reduce the independence of the board and affect the sustainability reporting as well. For these reasons I decide to include it in my later discussion.

#### **2.4.3.1 CSR Committee**

Several studies have found a positive association between the existence of a CSR committee on the board or, more generally, the sustainability orientation of directors, and the disclosure of ESG information.

Peters and Romi (2014) and Liao et al. (2015) find that firms with a CSR committee are more likely to disclose their green-house gas emissions information and that the disclosure is of higher quality. Firms with a CSR committee also tend to disclose information on social issues more comprehensively (Michelon and Parbonetti, 2012).

Fatemi et al. (2017) also find the existence of a CSR committee on the board of directors to be significantly and positively associated with ESG disclosure, measured through Bloomberg ESG disclosure score. Furthermore, Peters and Romi (2015) study the association of sustainability oriented corporate governance mechanisms and the voluntary assurance of sustainability reports. They find the existence of a Chief Sustainability Officer to be positively related to disclosure assurance, while only if there are directors with sustainability expertise inside the committee this has an impact on the likelihood of adopting sustainability assurance. According to the authors, this supports “the position that some firms establish sustainability related governance merely to conform to socially desired behaviour”.

### **2.4.3.2 Board Size**

The relation between board size and non-financial disclosure is ambiguous.

Some studies report of a positive association (Tamimi and Sebastianelli, 2017; Donnelly and Mulcahy, 2008; Allegrini and Greco, 2013). However, board size is very correlated to firm size, which may be responsible for the positive association (Donnelly and Mulcahy, 2008). The literature suggests that larger boards may be less effective than smaller boards in mitigating agency conflicts, as the monitoring capacities are more than compensated by slower decision making and coordination problems (Jensen, 1993). This ineffectiveness is predicted to lead to a lower quality of disclosure since the board is unable to carry out its role efficiently (Said et al. 2009). However, in a setting characterized by large controlling shareholders, size can contribute to board effectiveness (Allegrini and Greco, 2013). Said et al. (2009) hypothesize a negative association between board size and CSR disclosure based on the previous argument but they find no significance. Cheng and Courtenay (2006) state that “there is no preponderance of theory or empirical evidence to suggest a relation between board size and levels of voluntary disclosure.”

Conversely, Fasan and Mio (2017) find a negative association with the disclosure of the materiality determining process.

### **2.4.3.3 Incentives for Sustainability**

Very few studies have analysed the relationship between the existence of incentives at executive level for sustainability performance and non-financial disclosure. However, it seems reasonable to assume that a positive relation between the two may exist. Hong et al. (2016) find that incentives for CSR lead to more CSR activities and better social performance as incentives align the interests of managers with their shareholders. This is coherent with agency theory, which suggests that executives must be incentivized to act in the interests of shareholders (Tamimi and Sebastianelli, 2017). Eccles et al. (2014) also find that high sustainability firms are “more likely to make executive compensation a function of environmental, social and external perception metrics.”

A significant positive association between ESG disclosure and sustainability incentives for executives is found, for instance, by Tamimi and Sebastianelli (2017).



#### **2.4.4 Non-financial disclosure and firm size**

There is strong evidence that both company size and industry classification affect the level of environmental disclosure, probably because larger firms have higher visibility and firms in environmentally sensitive industries face stronger pressures and are more subject to possible environmental legislation (Patten, 2002).

Both Fifka (2013) and Hahn and Kühnen (2013) in their reviews of extant literature find size to be one of the most widely recognized variable positively affecting non-financial disclosure, under the assumption, as previously said, that larger firms are more visible and face higher pressures from stakeholders. This association finds its theoretical background in stakeholder theory, institutional theory and legitimacy theory. These theories are partly overlapping, as they all focus on pressures different stakeholders exert on firms (Tamimi and Sebastianelli, 2017). Another argument is that environmental and social issues which are cause of concerns to the society, may become the subject of new laws. Since larger companies are more visible to the public, they are also more likely to attract regulatory bodies' attention. Therefore, they will disclose more to avoid regulation. Furthermore, larger firms are more likely to use formal communication channels (Chan et al., 2014). Another explanation of the relation is the existence of economies of scale with respect to information production costs (Clarkson et al. 2008).

A vast majority of studies finds a significant positive association between disclosure (either level or quality) and firm size (measured through assets, employees, revenues or market capitalization). For instance, see Chan et al. (2014), Clarkson et al. (2008), Clarkson et al. (2011), Tamimi and Sebastianelli (2017), Eng and Mak (2003), Huafang and Jianguo (2007), Fatemi et al. (2017).

On the other hand, a non-significant relation is found, for instance, by Hummel and Schlick (2016) in the association of disclosure quality and size.

Al-Tuwajiri et al. (2004) also find no significance, but the study is limited to the disclosure of specific pollution information, which, as recognized by the author, may affect the relation. Given both theoretical background and empirical evidence, I include firm size, measured as the natural logarithm of full-time employees, as a control variable in my models, expecting a positive association with non-financial disclosure (larger firms disclose more).

### **2.4.5 Non-financial disclosure and profitability**

Empirical evidence on the relation between profitability and sustainability reporting is mixed (Hahn and Kühnen, 2013). Several studies assume a positive relation, under the assumption that more profitable companies are more able to bear the costs of sustainability reporting and face the consequences of reporting potentially damaging information. In other words, more profitable firms may be able to better sustain the proprietary costs of disclosing (Hahn and Kühnen, 2013; Cormier and Magnan; 2003). Firms with superior upcoming performance may also disclose more to reveal the good news to markets (Clarkson et al., 2008).

Tagesson et al. (2009) find evidence of significant positive association of profitability (measured through ROE) and CSR disclosure on company's website.

Haniffa and Cooke (2005) find a significant positive association of financial performance, measured through ROE, and CSR reporting by Malay companies in both 1996 and 2002. Cormier and Magnan (2003) include three variables as proxy for proprietary costs in their model: leverage, annual stock market return and the ratio of net income to assets. They find a significant positive association of environmental reporting by French companies with market returns and a negative association with leverage. However, no significance is found in the relation with ROA.

On the other hand, several studies have found no significant influence of profitability on disclosure. For instance, see Ho and Wong (2001) or, more recently and focusing on environmental disclosures, Cormier (2015). Eng and Mak (2003) use alternatively ROE and ROA as measures of profitability but they find no significance in the association with voluntary disclosure for both. Using ROA, both Clarkson et al. (2008) and Fatemi et al. (2017) find no significance in the association with environmental disclosure and ESG disclosure respectively. However, Fatemi et al. (2017) find a significant positive association of ROA with the interaction term of ESG disclosure and ESG concerns. In their model, they also include the growth of ROA but find the variable to be non-significant as well.

Evidence of a non-significant relation between ROA and non-financial disclosure (specifically, the use of GRI, which is relevant for my analysis) is given by Prado-Lorenzo et al. (2009). Further evidence comes from Reverte (2009), who finds no significance in the relation of ROA and CSR reporting by Spanish companies.

In conclusion, the theory would suggest a positive association between economic performance and sustainability disclosure. This leads most existing papers to control for profitability (often measured through ROE or ROA) when examining the determinants of sustainability reporting. However, it seems that many studies have failed to establish a link between these variables.

As Hahn and Kühnen (2013) state in their review of literature, a negative association seems unlikely, but results are inconclusive. Following the theoretical recommendation and what seems a common practice in the literature I include a measure of economic performance, specifically ROE (computed as Net Income divided by total equity), to control for the possible positive effect of profitability on disclosure suggested by the theory. Given the theoretical background, I expect the association, if found significant, to be positive.

#### **2.4.6 Capital intensity and investments**

I decided to also control for the level of investments of the company, measured by the Capital Expenditure. Capital intensity can be posited to have a positive association with sustainability reporting, assuming that companies want to signal the newness and superior sustainability performances of their assets.

This comes from the reasoning that companies that invest more are likely to have newer assets and that this in turn results in better sustainability performance (Clarkson et al. 2008): this view is in accordance with the voluntary disclosure theory.

On the other hand, legitimacy theory would suggest a negative association, as companies with older assets have worse environmental performances and, as a consequence, disclose more to obtain a legitimizing effect. Following the arguments on the positive association, Clarkson et al (2008) and Clarkson et al. (2011) find the relation to be positive and significant.

Fortanier et al. (2011) find a significant association of capital intensity only with reporting of climate change issues, but no significance in the association with the reporting of other CSR issues. Other studies have found a negative association (Fatemi et al. 2017). In general, evidence is mixed but very few empirical studies have investigated this relation (Hahn and Kühnen, 2013). I include this variable but I do not make any expectation on the sign, if significance is found.

### 2.4.7 Debt level and leverage

Several studies have found a significant correlation between leverage and non-financial disclosure. However, theoretical expectations and empirical evidence on the sign of this relation are ambiguous.

Clarkson et al. (2008) find a strong positive correlation between leverage, measured as the ratio of total debt to total assets, and level of environmental disclosure. They argue that the monitoring demand for information by a company's creditors increases as firm debt increases and since agency cost of debt are also higher for firms with higher leverage, voluntary disclosure is expected to increase. In this sense, leverage can be seen as a proxy for the informational needs of creditors (Hummel and Schlick, 2016).

A similar argument is made by Huafang and Jianguo (2007), who contend that firms seek to reduce these increased costs by disclosing more. However, they do not find significance in the relation of leverage (measured as the ratio of total liabilities to total assets) and voluntary disclosure.

Hummel and Schlick (2016) find leverage to be significantly positively related to high quality sustainability disclosures and negatively to low quality disclosure.

An opposite relationship is expected by Eng and Mak (2003) who argue that *"increased leverage is expected to reduce disclosure because leverage helps control the free cash flow problem, and the agency costs of debt are controlled through restrictive debt covenants in debt agreements rather than increased disclosure of information in annual reports"*. The authors find a significant negative relation, but the association seems not robust to the inclusion of different variables.

A negative relation is found also, for instance, in Fatemi et al. (2017).

Interestingly, Prado-Lorenzo et al. (2009) find a negative association of debt to equity ratio and CSR reporting where information has been verified by independent entities and the format is certified to be "in accordance" by GRI, while they find a positive association with CSR reporting that meets the requirements of GRI but has not been certified. In their review of extant literature, Hahn and Kühnen (2013) find *"indifferent results"* for the relation between leverage (or debt level) and adoption, extent and quality of sustainability disclosure. They also share the view that there is no unambiguous theoretical expectation on the sign of the relation.

Given the theoretical background and empirical evidences, I include a measure of the level of debt as a control variable, but do not form any expectation on the sign of the relation.

I use the net debt as a measure of the level of indebtedness, scaled by total assets.

## 2.5 Research questions and hypotheses

The following section is dedicated to the formulation of the research questions and the specific hypotheses that compose each one of them, developed following the analysis of the literature.

### 2.5.1 Research question 1: disclosure related variables

In the first research question I want to evaluate whether some sustainability-related variables have a significant impact on the completeness of non-financial disclosures by firms in my sample, measured through the Material Non-financial disclosure score (MNFD). Specifically, I want to evaluate the impact of the following aspects (represented by binary variables):

- Being a signatory of the UN Global Compact.
- Adhering to the UN Sustainable Development Goals.

My hypothesis is that being a signatory to the UN GC and to the UN SDGs is associated to increased non-financial disclosure. These variables represent discretionary choices by the firm, therefore, the commitment to them may show higher concern and engagement in sustainability issues, which should be reflected into a more complete disclosure (Al-Tuwajiri et al., 2004).

I therefore state the following hypotheses:

***H1.1:** There is a positive relation between being a signatory of UN GC and the extent of non-financial disclosure.*

***H1.2:** There is a positive relation between adhering to the UN SDGs and the extent of non-financial disclosure*

I first evaluate the effect of the single variables through univariate non-parametric tests (to account for the non-normality of MNFD), and then I test for the robustness of the findings to the inclusion of more variables. Specifically, I will use a regression model to test the two

variables jointly and together with the control variables I have chosen. This is relevant because, as I qualitatively discussed in the data description section, and I will quantitatively show later, the variables are correlated to size.

### **2.5.2 Research question 2: ownership structure**

Based on the analysis of the literature, I now formulate my hypotheses on the association of ownership structure and non-financial disclosure. Specifically, I want to evaluate the association of disclosure with:

- Ownership concentration, measured by the share of ownership of the single largest shareholder, coherently with Fatemi et al. (2017).
- Government ownership, evaluated through a dummy variable which assumes value of 1 if a government agency is present in the capital of the company and 0 otherwise. Government agency includes the state, municipalities and other public administration entities.

Given the review of the literature and the perspective of agency theory which I assume, I expect a negative relation with ownership concentration, while I expect an association with government ownership, but I do not form any specific expectation on the sign of such association, since conflicting theories and mixed results exist in the literature.

Therefore, I state the following hypotheses:

***H2.1:** The extent of non-financial disclosure depends negatively on ownership concentration.*

***H2.2:** The extent of non-financial disclosure depends on the presence of government entities among shareholders.*

### **2.5.3 Research question 3: ESG performance**

Most studies carried under voluntary disclosure theory and legitimacy theory assume non-financial disclosure to be voluntary, which is not anymore the case in the context of my analysis. In fact, the shift in the regulatory framework toward mandatory disclosure, which requires firms to disclose certain information, coupled with my focus on firms adopting GRI, changes the hypotheses of the majority of the studies analysed. GRI has a focus on

quantitative, “hard”, measures. I therefore want to analyse whether, in a mandatory reporting framework, there is an association between non-financial performance and non-financial disclosure.

Given the choice of a sample of companies disclosing through the GRI framework which imposes certain standards in terms of extent and “quality” of disclosure (Clarkson et al. 2008), my hypothesis is that there would be a positive relation between non-financial performance and disclosure, as firms do not have anymore the “legitimizing” effect which derives from disclosing non-financial information (since it is compulsory) but can still enjoy the benefits of signalling a superior performance through a wider disclosure.

Furthermore, firms that have a stronger focus on ESG issues, that undertook sustainability activities, are more likely to have a higher ESG score and will have all the interest to disclose about their superior performances and the activities they carried. Finally, most previous studies focused on environmental performances and disclosures, often using even narrower definitions with specific sets of environmental aspects both to evaluate disclosure and performance. On the other hand, given again the new regulatory framework which encompasses reporting requirements over multiple sustainability aspects, and the focus on GRI which has the same broad sustainability focus, I believe it is worth assessing the relation using a broad definition of non-financial disclosure, which encompasses all the ESG (environmental, social, governance) aspects. Recent research (Giudici and Bonaventura, 2018) has also shown how the joint consideration of these aspects leads to improved stock returns, while this is not the case when considering these aspects separately. This adds strength to my idea of considering all these aspects together and not limiting the analysis to only environmental aspects. I could still check later the single effects of the pillars.

***H3.1:** The extent of non-financial disclosure depends positively on ESG performance.*

#### **2.5.4 Research question 4: corporate governance**

Given the analysis of the extant literature, I aim at analysing the association of ESG disclosure, measured through the material non-financial disclosure score (MNFD), and the following corporate governance variables:

- Board size: I expect board size to be associated with the extent of material non-financial disclosure. Empirical evidence would seem to lean toward a positive association, although evidence is far from conclusive. Considering also the inconsistencies in theoretical suggestions I do not form any expectations on the sign of the association.
- CEO duality: there is evidence in the literature of the significance of CEO duality as a determinant of voluntary disclosure. My hypothesis is that, in agreement with agency theory and literature, CEO duality will be negatively associated with non-financial disclosure.
- CSR Committee: as showed, several studies have found a positive association between the existence of a CSR committee and ESG disclosures. Therefore, I expect a positive association with non-financial disclosure.
- CSR compensation incentives: the literature on the association between the existence of monetary incentives for executives related to CSR and the disclosure of ESG information is limited. However, it would be common sense to assume a positive association between this variable and the level of material non-financial disclosure. Furthermore, empirical evidence, even if scarce, points toward a significant positive relation. Therefore, I expect a positive association between these two.
- Gender diversity: the literature shows mixed results here, pointing a bit towards the positive relation between women board members and non-financial disclosure. However, since the results are mixed do not form any expectations in this case.
- Specific skills: this represents the diversity of the board in terms of competencies. Since literature is very scarce on this, I do not form any expectation.
- Board independence: the theory suggests that the relation between this variable and the non-financial disclosure should be positive, and in the results from the literature show mainly this, even if there are some cases of inconclusiveness. However, I expect this relation to be positive
- Average board tenure: this is really little analysed in the literature, but it could be a trait of the governance with some relation with the non-financial disclosure. I do not form any expectation though.



The following hypotheses are formulated:

**H4.1:** *The extent of non-financial disclosure depends negatively on CEO duality.*

**H4.2:** *The extent of non-financial disclosure depends positively on the existence of a CSR committee on the board of directors.*

**H4.3:** *The extent of non-financial disclosure depends positively on the existence of monetary incentives for executives related to CSR.*

**H4.4:** *The extent of non-financial disclosure depends positively on board independence.*

**H4.5:** *The extent of non-financial disclosure depends on board size.*

**H4.6:** *The extent of non-financial disclosure depends on gender diversity.*

**H4.7:** *The extent of non-financial disclosure depends on board specific skills.*

**H4.8:** *The extent of non-financial disclosure depends on average board tenure.*

## **3 Data collection, description and preliminary findings**

In this chapter, I will describe the data collection process and provide some preliminary analysis of the data, with a focus on the differences between countries and sectors. I also perform an analysis on specific indicators by sectors under the Multiple response set analysis paragraph.

### **3.1 Data collection**

This section is dedicated to the description of the data used in the analysis, the process followed to collect them, the sources, the main limitations of the approach and some preliminary findings.

#### **3.1.1 Goals of the data gathering process**

Following the transposition in 2016 of directive 2014/95/EU into national law across Europe, 2019 is the second year of publication of mandatory non-financial disclosures from large public-interest entities, which established Europe as a world leader in the field of corporate transparency and accountability.

Today more than ever we need real tools to take a big step towards sustainable investment. Only this way Europe could try to achieve the ambitious targets of the 2030 UN Agenda and of the Paris Agreement, which are estimated to require around €180bn in extra yearly investment over the next decade.

In this context, I set out with the goal of gathering up-to-date and reliable data on the non-financial disclosures, in particular on the extent of the disclosure.

I collected data for European companies listed on STOXX Europe 600.

With a fixed number of 600 components, the STOXX Europe 600 Index represents large, mid and small capitalization companies across 17 countries of the European region: Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Norway, Poland, Portugal, Spain, Sweden, Switzerland and the United Kingdom. Its

composition is reviewed four times a year, in March, June, September, December.<sup>12</sup> My dataset refers to the index composition in July 2019, so after the June revision.

The choice of this index allows me to capture a large enough sample of European listed companies, maintaining a good diversification in terms of size and industry.

### **3.1.2 Methodology**

All data have been collected from publicly available sources, namely firms' websites, annual reports, integrated reports, and sustainability reports (also called non-financial statements).

### **3.1.3 General information**

I created a summary sheet containing general information on the non-financial disclosure. For each firm I reported name, country, and the sector/industry as reported by Bloomberg.

The "sector" variable can take ten values: Financials, Utilities, Industrials, Consumer Discretionary, Consumer Staples, Health Care, Technology, Energy, Communications, Materials. The reporting year, given the timing of the data collection, is 2018 for all firms. Obviously, there can be variation in the reporting periods, but this misalignment has been considered not relevant to the purpose of the analysis.

The following information have also been collected:

- Whether the company is required to disclose non-financial information
- In case non-financial reporting is not compulsory for that company, which is the parameter of the rule that the company does not meet (e.g. less than 500 employees or company is a subsidiary).
- Whether the company has published a non-financial disclosure.

#### **3.1.3.1 Disclosure frameworks**

The 2014/95/EU directive gives companies flexibility in the choice of the framework to use to prepare the non-financial disclosure. It can be either an international, European or national framework. The only requirement is that the framework used should be clearly indicated.

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<sup>12</sup> For more details on the methodology behind the composition of the index see:  
[https://www.stoxx.com/document/Indices/Common/Indexguide/stoxx\\_index\\_guide.pdf](https://www.stoxx.com/document/Indices/Common/Indexguide/stoxx_index_guide.pdf)

Furthermore, companies may also use a mix of different standards or use a proprietary approach, given, obviously, that they comply with all the disclosure requirements of the directive.

The majority of firms decided to prepare their non-financial disclosure following one of the versions of the GRI framework:

- GRI G4: It is the older version of the GRI framework, released in 2013. It should not be used anymore but some companies still use it.
- GRI Standards: Newest version of the GRI framework released in 2016 and slightly updated in 2018.

If the company follows GRI G4 or GRI Standards guidelines, it can choose between two alternatives, which differ in terms of completeness of the disclosure requirements:

- Core: requires disclosure of only some topic specific indicators and at least one indicator for each material aspect
- Comprehensive: adds more Standard Disclosures and requires disclosure of all indicators for each material aspect. It is the most complete version of the GRI that the company may choose.

I also collected data on the sector specific guidelines provided by GRI. If the company does not follow any sector specific guideline, this may be due to no specific guidelines available for the relevant sector. Therefore, it is not necessarily a “fault” on the part of the company.

For a detailed description of GRI G4, GRI Standards, core and comprehensive options and sector-specific guidelines, see paragraph *Reporting standards*.

Data have been collected also on the participation of companies in United Nations sustainability initiatives, specifically:

- UN GC: “1” if the company is a signatory of the UN Global Compact, which commits the company to some sustainability principles and to releasing annually a Communication on Progress (COP). Data on the signatories of the UN GC can be found at the GC website<sup>13</sup>.
- UN SDGs: “1” if the company follows the UN Sustainable Development Goals (SDGs) in the construction of the report. This information has been retrieved from the non-financial disclosure of the company.

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<sup>13</sup> <https://www.unglobalcompact.org/what-is-gc/participants>

Note that, when a company is signatory of the UN Global Compact, it should commit to pursuing the SDGs, therefore, it happens often that a company is a signatory and it also uses SDGs in the disclosure.

The use of GRI and SDGs is not exclusive. The SDG Compass, developed by GRI, UN Global Compact and the World Business Council for Sustainable Development (WBCSD), provides a guide to the integration of GRI and SDGs, that is, how to use GRI to report on the SDGs. More information on the Global Compact and the SDGs can be found in the *Reporting standards* section.

Finally, data related to the Carbon Disclosure Project (CDP) scores, as found on the CDP website<sup>14</sup>, have been gathered. I included three ratings produced by CDP: Climate Change, Water, Forests. For each one, the score can be:

- {A, A-, B, B-, C, C-, D} is the rating in the corresponding category. It is computed annually by CDP based on the answers to a questionnaire sent to each company.
- “N/A”: no data on the corresponding category is disclosed on CDP’s website for that company. This should be interpreted as CDP not sending the questionnaire for that category to that company.
- F (no response): The relevant questionnaire has been sent but CDP has received no answer from the company. In this case, CDP assigns a rating of F in the corresponding category.
- F (declined to participate): The relevant questionnaire has been sent but the company declined to participate. CDP again assigns a rating of F.

Climate change ratings are available for most large companies, while it is available for a few of the smaller ones. Water and Forests rating are more rarely available even for larger companies.

### **3.1.4 GRI G4 and GRI Standards**

I collected detailed data for each firm on all the different aspects and indicators contained in the framework that have been disclosed by companies. This information can be found by analysing the non-financial statements.

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<sup>14</sup> <https://www.cdp.net/en/responses>

Data have also been collected on sector-specific guidelines, detailing the indicators disclosed by each firm adopting the relevant guideline.

### 3.2 Description of key findings

I collected data on 599 companies<sup>15</sup>. The most relevant information is summarized in *table 1*. Overall, 94.7% of the companies were required to prepare a non-financial disclosure according to Directive 2014/95/EU, while the remaining companies were exempted either because they are subsidiaries or do not meet the requirements in terms of number of employees.

Some companies prepared a non-financial disclosure even if it was not required, while I was unable to retrieve non-financial disclosure for some companies even if they were required to disclose, thus I considered those firms non-compliant.

**Data on the entire sample**

	# companies	% of entire sample
Sample size	599	100%
Required to disclose	567	94.7%
Prepared CSR	572	95.5%

*Table 1: Data on the entire sample*

**Data on firms that prepared NFD**

	# companies	% of reporters
GC	337	58.9%
SDGs	394	68.9%
GRI Standards	322	56.3%
GRI G4	9	1.6%
SASB	6	1.0%

*Table 2: Data on NFD reporters*

<sup>15</sup> Not 600 because the company Unilever is listed both in the London Stock Exchange and in the Euronext Amsterdam and both listings are present in the STOXX 600 index.

The combination of these two factors leads to the difference between firms required to disclose and firms that prepared the NFD. In particular, 331 companies (57.9% of companies publishing a NFD) prepare their non-financial disclosure following one of the versions of the GRI. These companies are those for which I collected more detailed information about the extent of the NFD and will constitute my final sample, which I will use to compute a non-financial disclosure score and to test my hypotheses. I will go more in-depth on these firms further on in this section. *Table 2* shows that the vast majority of firms used the newest version of the GRI framework (GRI Standards) compared to the oldest GRI G4 (only 9 companies are still using the old standard).

Moreover, it can be seen how there are more companies adhering to the SGDs than signing the GC.

There is some overlapping between these variables since one of the requirements of the GC is to pursue the Sustainable Development Goals (see *Reporting standards*). However, some companies are signatories of the GC but do not report on the SDGs while others report according to SDGs but are not signatories of the GC.

In *table 3* it is possible to see a comparison among countries. It must be pointed out that Switzerland is the only country out of 17 which does not belong to EU, so the Directive does not apply for Swiss companies, which can decide whether to disclose non-financial information or not. However, the numbers for Switzerland are similar to the ones for the other countries.

Country	Firms	Required to disclose		Prepared CSR		GC over reporters		SDGs over reporters		GRI over reporters	
	#	#	%	#	%	#	%	#	%	#	%
Austria	8	8	100%	8	100%	6	75%	7	88%	7	88%
Belgium	15	12	80%	13	88%	6	46%	11	85%	9	69%
Denmark	23	23	100%	23	100%	18	78%	19	83%	5	22%
Finland	17	17	100%	17	100%	14	82%	16	94%	16	94%
France	85	84	99%	84	99%	70	83%	60	71%	34	40%
Germany	74	70	95%	70	95%	38	54%	45	64%	52	74%
Ireland	11	11	100%	11	100%	2	18%	5	45%	3	27%
Italy	29	28	97%	29	100%	17	59%	24	83%	28	97%
Luxembourg	8	7	88%	5	75%	2	40%	2	40%	3	60%
Netherlands	31	30	97%	29	94%	16	55%	24	83%	20	69%
Norway	14	14	100%	14	100%	13	93%	12	86%	11	79%
Poland	9	7	78%	7	78%	0	0%	3	43%	3	43%
Portugal	4	4	100%	4	100%	4	100%	4	100%	4	100%
Spain	27	25	93%	27	100%	24	89%	22	81%	24	89%
Sweden	42	38	90%	41	98%	36	88%	35	85%	35	85%
Switzerland	56	52	93%	49	88%	28	57%	36	73%	36	73%
UK	146	137	94%	141	97%	43	30%	69	49%	41	29%
<b>Total</b>	<b>599</b>	<b>565</b>	<b>94%</b>	<b>572</b>	<b>95%</b>	<b>337</b>	<b>59%</b>	<b>394</b>	<b>69%</b>	<b>331</b>	<b>58%</b>

Table 3: Data on total sample by country

We can see how the lowest adoptions of GRI are for countries from Denmark (22%), United Kingdom (29%), and France (40%), all countries which had already in place a legislation for environment or sustainability before EU Directive. Usually state legislation comes with a framework that companies follow. A company which has been using for many years another framework appears to be a bit reluctant to change to GRI.

On the other hand, in countries like Italy or Spain, where there was not mandatory regulation before the transposition of the EU Directive, the adoption of GRI is much higher.



### 3.2.1 GRI users

This section goes more in depth on my final sample, made of the 331 companies preparing their disclosure following one of the versions of the GRI framework. For these firms, *table 4* shows the adoption of Global Compact and of the Sustainable Development Goals disaggregated by countries, with an aggregated total at the end.

72.5% of firms in the final sample are signatories of the GC and 88.2% report to the SDGs. Again, differences may be mediated by different practices among countries.

We can see that also in this case SDGs reporters are more than GC ones, and for both these UN standards we see a higher adoption in this sample compared to the case of 599 countries. Regarding GC, the range of adoption is between 56% and 100% (we do not consider Poland and Ireland since they are represented by just 3 companies). As in the case of the full sample, the countries with the highest percentages are France, Spain, Norway, and Sweden, with values over 90% (in this case we do not consider Denmark and Portugal since the sample for them is very small).

Regarding SDGs, it seems that there is less variability across countries, with the only exceptions being Ireland and Luxembourg, but they are represented by just 3 companies each so we cannot say that this fact is relevant.

In Germany, Italy, and Switzerland the companies disclosing on SDGs are slightly less than 85%, while in the remaining 12 countries we are always above this value.

Country	Companies	Global Compact		SDGs	
	#	#	%	#	%
Austria	7	5	71.4%	6	85.7%
Belgium	9	5	55.6%	9	100%
Denmark	5	5	100%	5	100%
Finland	16	14	87.5%	16	100%
France	34	32	94.1%	33	97.1%
Germany	52	32	61.5%	41	78.8%
Ireland	3	1	33.3%	2	66.7%
Italy	28	17	60.7%	23	82.1%
Luxembourg	3	2	66.7%	2	66.7%
Netherlands	20	15	75%	20	100%
Norway	11	10	90.9%	10	90.9%
Poland	3	0	0%	3	100%
Portugal	4	4	100%	4	100%
Spain	24	22	91.7%	21	87.5%
Sweden	35	32	91.4%	32	91.4%
Switzerland	36	21	58.3%	30	83.3%
United Kingdom	41	23	56.1%	35	85.4%
<b>Total</b>	<b>331</b>	<b>240</b>	<b>72.5%</b>	<b>292</b>	<b>88.2%</b>

Table 4: GC signatories and SDGs reporters by country

We could also divide the data by sector: industry differences may arise from differences in what is considered material, different disclosure requirements (some industries may be more regulated than others, especially when it comes to environment), and different pressures from the external environment (e.g.: local communities, customers, employees).

From *table 5* it can be noticed that there are some differences across industries, similar as before in GC and a bit more for SDGs.

This is a key topic that will be analysed in a more formal way in the relevant section, since industry differences are at the basis of the approach to the computation of the non-financial disclosure score. In particular, refer to the *Multiple response set analysis*, *Univariate analysis* and *Non-financial disclosure score design* sections for more details.

Sector	Companies	GC		SDGs	
	#	#	%	#	%
Communications	24	13	54.2%	18	75.0%
Technology	15	13	86.7%	14	93.3%
Consumer staples	23	17	73.9%	21	91.3%
Consumer discretionary	39	23	59.0%	35	89.7%
Energy	17	14	82.4%	17	100%
Utilities	21	18	85.7%	21	100%
Industrials	50	40	80.0%	45	90.0%
Materials	47	40	85.1%	47	100%
Health care	22	13	59.1%	15	68.2%
Financials	73	49	67.1%	59	80.8%
<b>Total</b>	<b>331</b>	<b>240</b>	<b>72.5%</b>	<b>292</b>	<b>88.2%</b>

Table 5: GC signatories and SDGs reporters by sector

It is interesting to notice here how the technology, materials, and utilities sectors have the highest share of signatories of the GC and of companies reporting on SDGs, followed closely by the energy and the industrial sectors, with all these five sectors having 80% or more companies signing the GC and 90% or more reporting on the SDGs.

This fact can be explained thinking at the impact that sectors like these have on sustainability, especially on the environment and on local communities; therefore these companies are the most closely watched by the stakeholders, who request more transparency from the companies.

On the other hand, companies in financial or communications sectors, which could cause a lower impact on sustainability, feel less the need to report on SDGs or to sign the GC.

In the next sections, I will analyse more in detail the differences among sectors by focusing on specific indicators. This will lead to the definition of the material indicators for each sector and of the non-financial disclosure score.

### 3.3 Multiple response set analysis

After having collected information on the GRI disclosure made by the companies in my sample, I perform a multiple response set analysis to estimate how many firms disclosed each indicator. This will enable us to understand if some indicators are used more than others or if there are some that are systematically avoided by companies. I carried out the analysis focusing both on the complete overall sample made of companies following GRI guidelines (with 331 firms) and on each of the ten sectors to check for “considerable differences” in the used indicators. I define “considerable difference” a positive or negative 30% difference between the GRI indicator frequency of use of one sector versus the frequency of use in the whole sample.

Aware that  $\pm 30\%$  is an arbitrary value, should I find several same-topic indicators that have a “considerable difference”, I will perform statistical tests to check for a non-arbitrary significant difference. Particularly, the test I will do is the Mann-Whitney test since data are not normal and the samples are independent.

In the analysis the percentage adoption of each indicator rather than the absolute value is considered.

To make all the companies comparable regardless of the framework used, I converted the GRI-G4 indicators into the GRI Standards. The conversion was done following the GRI-G4 to GRI Standards mapping guidelines provided by the Global Reporting Initiative<sup>16</sup>. Most of the G4 indicators had a unique correspondence with a GRI Standards indicator, while some were more heavily revised and some discontinued. For the indicators that did not have a unique correspondence, I transposed them into GRI Standards on a case-by-case basis according to the description of the change in the report of each company.

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<sup>16</sup> Global Reporting Initiative - “Mapping G4 to the GRI Standard - Complete”

### 3.3.1 General disclosures (GRI 102)

Considering all companies, independently from the sector they belong, all the indicators have been chosen at least by one company, with most indicators being widely used.

However, there is a significant decrease in

the adoption rate for the 21 indicators going from number 102-19 to 102-39 (*table 6*). In the core version of GRI disclosure it is not needed to disclose these indicators.

It is relevant to see that these indicators coincide with the section dedicated to the corporate governance related information disclosure. Here, some relevant aspects are included such as data and details about in-company processes to report critical concerns to the governance body or information about remuneration policies for the highest governance body and senior executives of the organization.

This drop in the average adoption rate characterizes all sectors, though, I can try to understand if the severity is different or not.

There are four sectors – consumer staples, materials, energy and utilities – that have several indicators in the range from 102-19 to 102-39 that show a positive 30% difference in the adoption frequency. Therefore, I perform a Mann-Whitney test for each one of them (*table 7* and *8*).

All companies - GRI 102	
GRI indicator	Average adoption
102-1 to 102-18	89.8%
102-19 to 102-39	39.8%
102-40 to 102-56	91.7%

*Table 6: GRI 102 average adoption rate*

Mann-Whitney test		
Null hypothesis: the two medians are equal		
	All sectors	Cons. staples
Sample size	21	21
Sample median	0.42	0.52
W	326.00	
p-value	0.002	

Mann-Whitney test		
Null hypothesis: the two medians are equal		
	All sectors	Materials
Sample size	21	21
Sample median	0.42	0.55
W	278.00	
p-value	0.000	

*Table 7: Tests on different levels of adoption rate of 102-19 to 102-39 (Consumer staples and Materials)*

Mann-Whitney test			Mann-Whitney test		
Null hypothesis: the two medians are equal			Null hypothesis: the two medians are equal		
	All sectors	Energy		All sectors	Utilities
Sample size	21	21	Sample size	21	21
Sample median	0.42	0.59	Sample median	0.42	0.48
W	278.00		W	335.00	
p-value	0.000		p-value	0.004	

Table 8: Tests on different levels of adoption rate of 102-19 to 102-39 (Energy and Utilities)

From the results we can see that we reject the null hypothesis in every case, and therefore in all these four sectors the companies adopt more these indicators if compared to the overall sample.

Conversely, in three other sectors – technology, financials, and health care – there are several indicators ranging from 102-19 to 102-39 showing a negative 30% difference in the frequency of adoption. Again, I use the Mann-Whitney test to see if there are significant differences (table 9).

Mann-Whitney test			Mann-Whitney test		
Null hypothesis: the two medians are equal			Null hypothesis: the two medians are equal		
	All sectors	Technology		All sectors	Health care
Sample size	21	21	Sample size	21	21
Sample median	0.42	0.27	Sample median	0.42	0.27
W	604.00		W	618.00	
p-value	0.000		p-value	0.000	

Table 9: Tests on different levels of adoption rate of 102-19 to 102-39 (Technology and Health care)

Mann-Whitney test		
Null hypothesis: the two medians are equal		
	All sectors	Financials
Sample size	21	21
Sample median	0.42	0.33
W	570.00	
p-value	0.003	

Table 10: Test on Financials levels of adoption rate of 102-19 to 102-39

The results show that the null hypothesis is rejected in all three cases: companies operating in these sectors tend to disclose less than the others on corporate governance matters.

For the remaining sectors – communications, industrials, and consumer discretionary – only few indicators have a 30% difference, which is negative for the communications and industrials sectors and positive for the consumer discretionary one. To define the behaviour a Mann-Whitney test is needed (*table 11 and 12*).

Mann-Whitney test			Mann-Whitney test		
Null hypothesis: the two medians are equal			Null hypothesis: the two medians are equal		
	All sectors	Communications		All sectors	Industrials
Sample size	21	21	Sample size	21	21
Sample median	0.42	0.42	Sample median	0.42	0.34
W		435.00	W		595.00
p-value		0.687	p-value		0.000

Table 11: Tests on different levels of adoption rate of 102-19 to 102-39 (Communications and Industrials)

Mann-Whitney test		
Null hypothesis: the two medians are equal		
	All sectors	Cons. discretionary
Sample size	21	21
Sample median	0.42	0.46
W		364.00
p-value		0.029

Table 12: Test on Consumer discretionary levels of adoption rate of 102-19 to 102-39

The tests show that industrial companies have a lower adoption rate of the indicators from GRI 102-19 to 102-39 if compared to the overall sample, while the consumer discretionary ones a lower adoption rate with 95% confidence. Regarding the communication sector, we cannot statistically say that the adoption rate is different from the overall sample since the p-value is 0.69.

### 3.3.2 Management approach indicators (GRI 103)

All three indicators are used by at least 85% of the companies (*table 13*), with no significant differences across sectors. This comes to no surprise, as these indicators concern the management approach for each material topic.

GRI Indicator	Description	Avg adoption
103-1	Explanation of the material topic and its Boundary	88.2%
103-2	The management approach and its components	87.6%
103-3	Evaluation of the management approach	85.5%

*Table 13: GRI 103 average adoption rate*

### 3.3.3 Economic indicators

Considering all the companies, independently from the sector they belong, we can notice that only five indicators out of 13 are disclosed by more than 50% of companies.

GRI Indicator	Topic	Description	Avg adoption
201-1	Economic performance	Direct economic value generated and distributed	75.8%
201-2	Economic performance	Financial implications and other risks and opportunities due to climate change	53.2%
205-1	Anti-corruption	Operations assessed for risks related to corruption	57.7%
205-2	Anti-corruption	Communication and training about anti-corruption policies and procedures	74.6%
205-3	Anti-corruption	Confirmed incidents of corruption and actions taken	58.0%

*Table 14: GRI economic indicators disclosed by more than 50% of companies*

As *table 14* shows, two of the indicators belong to the economic performance topic, with 201-1 being the most disclosed in the economic indicators' category. The other three of the indicators belong to the anti-corruption topic, a matter that is seriously taken under



consideration by corporations; we can see that all three indicators composing the anti-corruption topic are disclosed by more than 50% of the companies. This is most likely due to the fact that the Directive 2014/95/EU clearly refers to the inclusion of information about instruments in place to fight corruption and bribery.

Moving the analysis on the single sector level, in three sectors – energy, materials, and consumer staples – there are several indicators with a 30% adoption frequency positive difference: we need Mann-Whitney tests to determine significance.

Mann-Whitney test Null hypothesis: the two medians are equal			Mann-Whitney test Null hypothesis: the two medians are equal		
	All sectors	Energy		All sectors	Materials
Sample size	13	13	Sample size	13	13
Sample median	0.46	0.59	Sample median	0.46	0.66
W	139.00		W	138.00	
p-value	0.065		p-value	0.058	

Table 15: Tests on different levels of adoption rate of economic indicators (Energy and Materials)

Mann-Whitney test Null hypothesis: the two medians are equal		
	All sectors	Consumer staples
Sample size	13	13
Sample median	0.46	0.56
W	157.00	
p-value	0.356	

Table 16: Test on Consumer staples levels of adoption rate of economic indicators

From the results (table 15 and 16) we can say with 90% confidence that the companies in the energy and materials sectors are more likely than the others to disclose on economic GRI indicators. Regarding consumer staples instead we cannot reject the null hypothesis and therefore we are not able to say with statistical significance that these companies are more likely to disclose compared to the overall sample.

In the health care, on the other hand, there are several indicators showing a negative 30% difference of the adoption frequency, so we perform a Mann-Whitney test here as well (table 17).

Mann-Whitney test		
Null hypothesis: the two medians are equal		
	All sectors	Health care
Sample size	13	13
Sample median	0.46	0.27
W	206.00	
p-value	0.124	

Table 17: Test on Health care levels of adoption rate of economic indicators

In this case, since the p-value is 0.12 we cannot reject the null hypothesis: we cannot say with statistical significance that health care companies are less likely to disclose economic GRI indicators.

Utilities and consumer discretionary sectors have very few indicators showing 30% difference, in both cases positive. To see if they are better disclosers with statistical significance we need to perform the test (table 18).

Mann-Whitney test			Mann-Whitney test		
Null hypothesis: the two medians are equal			Null hypothesis: the two medians are equal		
	All sectors	Utilities		All sectors	Cons. discretionary
Sample size	13	13	Sample size	13	13
Sample median	0.46	0.48	Sample median	0.46	0.41
W	170.00		W	183.00	
p-value	0.798		p-value	0.720	

Table 18: Tests on different levels of adoption rate of economic indicators (Utilities and Consumer discretionary)

No significance is found for either of them, so we cannot statistically say that they are different from the overall sample.

Same goes for industrials and financials sectors, but this time negative differences can be noticed. Performing the tests (table 19), we see that also in this case the difference is not statistically significant.

Mann-Whitney test			Mann-Whitney test		
Null hypothesis: the two medians are equal			Null hypothesis: the two medians are equal		
	All sectors	Industrials		All sectors	Financials
Sample size	13	13	Sample size	13	13
Sample median	0.46	0.46	Sample median	0.46	0.45
W	188.00		W	189.00	
p-value	0.538		p-value	0.505	

Table 19: Tests on different levels of adoption rate of economic indicators (Industrials and Financials)

For the remaining sector, communications, we have very few 30% differences in adoption frequency and not a clear sign (two negative and one positive). However, we still need to test in order to address the significance of the difference (table 20).

Mann-Whitney test		
Null hypothesis: the two medians are equal		
	All sectors	Communications
Sample size	13	13
Sample median	0.46	0.46
W	174.00	
p-value	0.959	

Table 20: Test on Communications levels of adoption rate of economic indicators

The results show that there is no statistical difference for the communications sector compared to the overall sample.

### 3.3.4 Environmental indicators

Analyzing the environmental indicators - considering all sectors together - it is possible to notice a great variance in the adoption rate. Three indicators are adopted by more than 85% of the companies (*table 21*).

GRI Indicator	Topic	Description	Avg adoption
302-1	Energy	Energy consumption within the organization	88.8%
305-1	Emissions	Direct (Scope 1) GHG emissions	90.3%
305-2	Emissions	Energy indirect (Scope 2) GHG emissions	88.2%

*Table 21: GRI environmental indicators disclosed by more than 85% of companies*

These are indicators that, no matter in what sector a company operates, are relevant to any organization, considered that the three targets identified by the European Commission 2030 *climate & energy framework* are related to cuts in the greenhouse gas emissions and improvements in the energy efficiency.

However, there are also some environmental indicators with a low adoption frequency. Four of them are disclosed by less than 15% of the companies (*table 22*).

GRI Indicator	Topic	Description	Avg adoption
303-4	Water and effluents	Water discharge	11.2%
303-5	Water and effluents	Water consumption	11.8%
304-4	Biodiversity	IUCN Red List species and national conservation list species with habitats in areas affected by operations	14.2%
306-5	Effluents and waste	Water bodies affected by water discharges and/or runoff	13.0%

*Table 22: GRI environmental indicators disclosed by less than 15% of companies*

The first two are part of the 2018 GRI update and it is not mandatory for the companies to include them in their non-financial disclosure; only after the 31<sup>st</sup> of December 2020 these indicators will become effective - if material - for GRI adopters.

The other two indicators are very specific ones, and therefore they are likely to be material for very few companies, and quite difficult to assess.

Looking for “considerable differences” across sectors, it is possible to notice that five sectors – energy, materials, utilities, consumer discretionary, and consumer staples – have several indicators with a + 30% adoption frequency. Therefore, I perform a test (*table 23, 24, and 25*):

Mann-Whitney test			Mann-Whitney test		
Null hypothesis: the two medians are equal			Null hypothesis: the two medians are equal		
	All sectors	Energy		All sectors	Materials
Sample size	32	32	Sample size	32	32
Sample median	0.36	0.50	Sample median	0.36	0.59
W	935.00		W	883.00	
p-value	0.161		p-value	0.036	

Table 23: Tests on different levels of adoption rate of environmental indicators (Energy and Materials)

Mann-Whitney test			Mann-Whitney test		
Null hypothesis: the two medians are equal			Null hypothesis: the two medians are equal		
	All sectors	Utilities		All sectors	Cons. discretionary
Sample size	32	32	Sample size	32	32
Sample median	0.36	0.45	Sample median	0.36	0.46
W	928.00		W	976.00	
p-value	0.134		p-value	0.394	

Table 24: Tests on different levels of adoption rate of environmental indicators (Utilities and Consumer discretionary)

Mann-Whitney test		
Null hypothesis: the two medians are equal		
	All sectors	Consumer staples
Sample size	32	32
Sample median	0.36	0.52
W	917.00	
p-value	0.100	

Table 25: Test on Consumer staples levels of adoption rate of environmental indicators

For the materials sector we can reject the null hypothesis with 95% confidence, and for the consumer staples we can reject it with 90% confidence, so we can say that the companies in these two sectors tend to more frequently adopt environmental indicators than the overall sample. In the other three cases we cannot reject the null hypothesis and hence we cannot say that energy, utilities, and consumer discretionary companies disclose more on environmental matters than the others.

It is a bit surprising for energy and utilities since they can have a strong impact on the environment and one could think they would disclose significantly more compared to the other sectors, but that is not the case.

On the other hand, there are four sectors – health care, financials, communications and technology – that have several indicators with a –30% adoption frequency. Indeed, the first three are sectors where the environmental impact is less relevant than other sectors, therefore companies in these sectors might have lower adoption frequency of environmental indicators. The technology sector is been historically a bit overlooked in terms of environment, but today it is considered to have a significant impact, because of the high obsolescence of tech products and because of the fact that the global travel required in tech supply chains contributes significantly to the planet’s greenhouse gas emissions. Either way, I perform the tests (*table 26 and 27*):

Mann-Whitney test			Mann-Whitney test		
Null hypothesis: the two medians are equal			Null hypothesis: the two medians are equal		
	All sectors	Health care		All sectors	Financials
Sample size	32	32	Sample size	32	32
Sample median	0.36	0.32	Sample median	0.36	0.20
W	1127.00		W	1218.00	
p-value	0.245		p-value	0.017	

*Table 26: Tests on different levels of adoption rate of environmental indicators (Health care and Financials)*

Mann-Whitney test			Mann-Whitney test		
Null hypothesis: the two medians are equal			Null hypothesis: the two medians are equal		
	All sectors	Communications		All sectors	Technology
Sample size	32	32	Sample size	32	32
Sample median	0.36	0.27	Sample median	0.36	0.30
W	1139.00		W	1140.00	
p-value	0.186		p-value	0.182	

*Table 27: Tests on different levels of adoption rate of environmental indicators (Communications and Technology)*

According to the tests, only the financials sector companies disclose less than the overall sample, with a confidence of 95%. For the other three sectors we cannot reject the null

hypothesis: there is no statistical difference from each of them compared to all the sectors considered together.

Lastly, for the industrials sector we see few negative 30% differences. Performing the test (*table 28*) we see once again that there is no significant difference.

Mann-Whitney test		
Null hypothesis: the two medians are equal		
	All sectors	Industrials
Sample size	32	32
Sample median	0.36	0.39
W	1050.00	
p-value	0.898	

*Table 28: Test on Industrials levels of adoption rate of environmental indicators*

### 3.3.5 Social indicators

Analysing social indicators for all the companies, the first thing to notice is that six indicators – from GRI 403-5 to 403-10 – all related to the occupational health and safety topic, are disclosed by less than 20% of companies. Again, these are all part of the 2018 GRI update and were not present before, so they will become effective – if material – after the 31<sup>st</sup> of December 2020. However, early adoption is strongly encouraged.

Other two indicators with less than 20% adoption rate are 410-1 (security personnel trained in human rights policies or procedures) and 411-1 (incidents of violations involving rights of indigenous peoples). For the former, the reason could be that it is very common for firms to hire external security companies, so it is often difficult to assess how these personnel are trained. The latter, involving indigenous communities, can be imagined as being material only for companies operating in specific areas, therefore it is disclosed very rarely.

On the other hand, just three indicators (see *table 29*) are disclosed by more than 70% of the total.

GRI Indicator	Topic	Description	Avg adoption
401-1	Employment	New employee hires and employee turnover	82.2%
403-2	Occupational health and safety	Hazard identification, risk assessment, and incident investigation	71.9%
405-1	Diversity and equal opportunity	Diversity of governance bodies and employees	88.5%

Table 29: GRI environmental indicators disclosed by more than 70% of companies

These are three indicators concerning three different GRI topics, but all regarding employees and their equal opportunities and safety, therefore material for many companies.

Applying the “considerable difference” method we can notice that the materials, energy, and utilities sectors have a positive 30% difference in the adoption rate of several indicators. We could expect that the companies belonging to these sectors disclose more than the others on the social matters because in these types of business the safety conditions of the employees and the protection of local communities are more critical if compared with the other sectors.

Mann-Whitney test			Mann-Whitney test		
Null hypothesis: the two medians are equal			Null hypothesis: the two medians are equal		
	All sectors	Materials		All sectors	Energy
Sample size	40	40	Sample size	40	40
Sample median	0.42	0.51	Sample median	0.42	0.53
W	1321.00		W	1443.00	
p-value	0.004		p-value	0.089	

Table 30: Tests on different levels of adoption rate of social indicators (Materials and Energy)

Mann-Whitney test		
Null hypothesis: the two medians are equal		
	All sectors	Utilities
Sample size	40	40
Sample median	0.42	0.43
W	1494.00	
p-value	0.227	

Table 31: Test on Utilities levels of adoption rate of social indicators



Conducting the tests (*table 30 and 31*) we can see how the materials sector and the energy one show a significant higher adoption of the GRI social indicators, even if with just 90% confidence for the latter. For the utilities test, with a p-value of 0.227, we cannot reject the null hypothesis and therefore we cannot say that these companies disclose more than the overall sample.

The technology and financials sectors conversely show several indicators with a 30% negative difference, so I perform the tests (*table 32*).

Mann-Whitney test			Mann-Whitney test		
Null hypothesis: the two medians are equal			Null hypothesis: the two medians are equal		
	All sectors	Technology		All sectors	Financials
Sample size	40	40	Sample size	40	40
Sample median	0.42	0.27	Sample median	0.42	0.28
W	1886.00		W	1822.00	
p-value	0.011		p-value	0.053	

*Table 32: Tests on different levels of adoption rate of social indicators (Technology and Financials)*

The technology sector shows a lower adoption of the social indicators, significant at 95%, while for the financials sector we have a lower adoption with 90% confidence.

For the industrials sector we see few indicators with a negative 30% difference with the overall sample, and again this hypothetical difference would make sense, so I perform a Mann-Whitney test so see if this is statistically confirmed (*table 33*).

Mann-Whitney test		
Null hypothesis: the two medians are equal		
	All sectors	Industrials
Sample size	40	40
Sample median	0.42	0.34
W	1703.00	
p-value	0.427	

*Table 33: Test on Industrials levels of adoption rate of social indicators*

In this case we are not able to reject the null hypothesis and hence we cannot say that the difference is significant.

The other sectors show several 30% differences but with mixed signs, so we do not make any expectation on the sign. Anyway, to see if there is some significant difference we need the Mann-Whitney test once again (*table 34 and 35*).

Mann-Whitney test			Mann-Whitney test		
Null hypothesis: the two medians are equal			Null hypothesis: the two medians are equal		
	All sectors	Cons. discretionary		All sectors	Health care
Sample size	40	40	Sample size	40	40
Sample median	0.42	0.45	Sample median	0.42	0.32
W		1544.00	W		1770.00
p-value		0.468	p-value		0.150

*Table 34: Tests on different levels of adoption rate of social indicators (Consumer discretionary and Health care)*

Mann-Whitney test			Mann-Whitney test		
Null hypothesis: the two medians are equal			Null hypothesis: the two medians are equal		
	All sectors	Communications		All sectors	Cons. staples
Sample size	40	40	Sample size	40	40
Sample median	0.42	0.42	Sample median	0.42	0.52
W		1625.00	W		1503.00
p-value		0.965	p-value		0.262

*Table 35: Tests on different levels of adoption rate of social indicators (Communication and Consumer staples)*

From the results we can see that neither of these sectors show a significant difference compared to the overall sample.

### 3.3.6 G4 Sector specific disclosures

These indicators are not significantly used, with neither of them being used by 50% or more of the companies belonging to that specific sector.

## 4 Disclosure score and univariate analysis

This chapter contains first the definition of the non-financial disclosure score and the description of its computation, then some preliminary univariate analysis. Normality tests, Mann-Whitney tests and Kruskal-Wallis tests are carried to evaluate the differences in the level of the disclosure score between sectors, indices and some other relevant variables.

### 4.1 Non-financial disclosure score design

Considering that the aim of my research analysis is to evaluate the determinants that drive the extent of a non-financial disclosure I need an indicator which could represent such extent. A first measure of the extent of the non-financial disclosure of a company can be computed as:

$$NFD_i = \frac{\sum_{j=1}^N J_{i,j}}{|N|} \quad i = 1, \dots, |M| ; j = 1, \dots, |N|$$

Where:

- $NFD_i$  = non-financial disclosure score for company  $i$
- $J_{i,j} = 1$  if company  $i$  discloses indicator  $j$ , 0 otherwise
- $M$  = total set of companies in the sample ( $|M| = 331$ )
- $N$  = total set of indicators in the GRI Standards ( $|N| = 144$ )

I also define:

- $k = 1, \dots, K$  is the sector to which the companies belongs ( $K = 10$ ).
- $M_k \subseteq M$  is a subset of  $M$  containing all companies that belong to sector  $k$ . According to my classification, each company belongs to one and only one sector.
- $N_k \subseteq N$  is a subset of  $N$  defined as the material indicators for sector  $k$ .  $N_k$  is defined following a “consensus” approach: I divided the companies in sectors (see *Data collection, description and preliminary findings*) and considered as material for that sector only the indicators disclosed by not less than 50% of the companies in that sector. This methodology identifies the indicators that are disclosed by more companies in each sector, which does not automatically mean that they are also the most material.

However, companies tend to disclose those indicators that are most material to them. Therefore, we can assume that, on average, the most disclosed indicators in each sector will also be the most material in that sector. The 50% threshold is derived from the SASB definition of the materiality of an indicator for a sector as “likely to be material for 50% or more companies in the sector”. Formally, the process is the following:

- For every sector  $k = 1, \dots, K$ :
  - For every indicator  $j = 1, \dots, N$ : If  $\frac{\sum_{i \in M_k} J_{i,j}}{|M_k|} \geq 0.5$  then
    - Indicator  $j$  is added to  $N_k$

The result is that

$$N_k = \left\{ j \mid \frac{\sum_{i \in M_k} J_{i,j}}{|M_k|} \geq 0.5 \right\} \quad k = 1, \dots, K$$

Having determined these variables, we can define two components that drive  $NFD_i$ :

- The *Material Non-financial Disclosure Score* ( $MNFD_i$ ) for company  $i \in M_k$ , computed for each company  $i$  considering the sector  $k$  to which the company belongs:

$$MNFD_i = \frac{\sum_{i \in N_k} J_{i,j}}{|N_k|} \quad i \in M_k$$

- The *Generic Non-financial Disclosure Score* ( $GNFD_i$ ) for company  $i \in M_k$ , which will also depend on the sector  $k$  to which the company belongs, since  $N \setminus N_k$  is the relative complement of  $N_k$  with respect to  $N$  (all the elements in  $N$  that are not in  $N_k$ ), that is, all the indicators that are not material to sector  $k$  according to my definition.

$$GNFD_i = \frac{\sum_{i \in N \setminus N_k} J_{i,j}}{|N| - |N_k|} \quad i \in M_k$$

$MNFD_i$  represents, for each company  $i$ , the ratio between the number of sector material indicators disclosed by the company over the total number of indicators that are material for the sector (according to the definition) to which the company belongs.

$GNFD_i$  represents the share of the remaining indicators (i.e. those not material for the company sector) disclosed by company  $i$ . As we can see from the analysis on absolute scores  $NFD_i$ , a great portion of its variability can be attributed to the fact that companies belong to different sectors (see paragraph *Comparison between NFD and MNFD* in chapter 4). However, considering that different sectors have different material aspects, as it is recognized by most extant literature (Eccles et al., 2012; Eccles and Serafeim, 2013; Khan et al., 2015), it would be unfair to compare companies based on  $NFD_i$ . Indeed, the number of indicators disclosed by two companies in different sectors may be different not because of a difference in their approach towards sustainability and transparency, rather because different sectors have different amounts of material aspects to disclose.

We can see from *figure 2* that sectors with higher average scores  $NFD_i$  are also sectors with the most material indicators. This derives from the “consensus” approach I used in selecting the material indicators for each sector, which assumes in turn that companies disclose what is material to them.

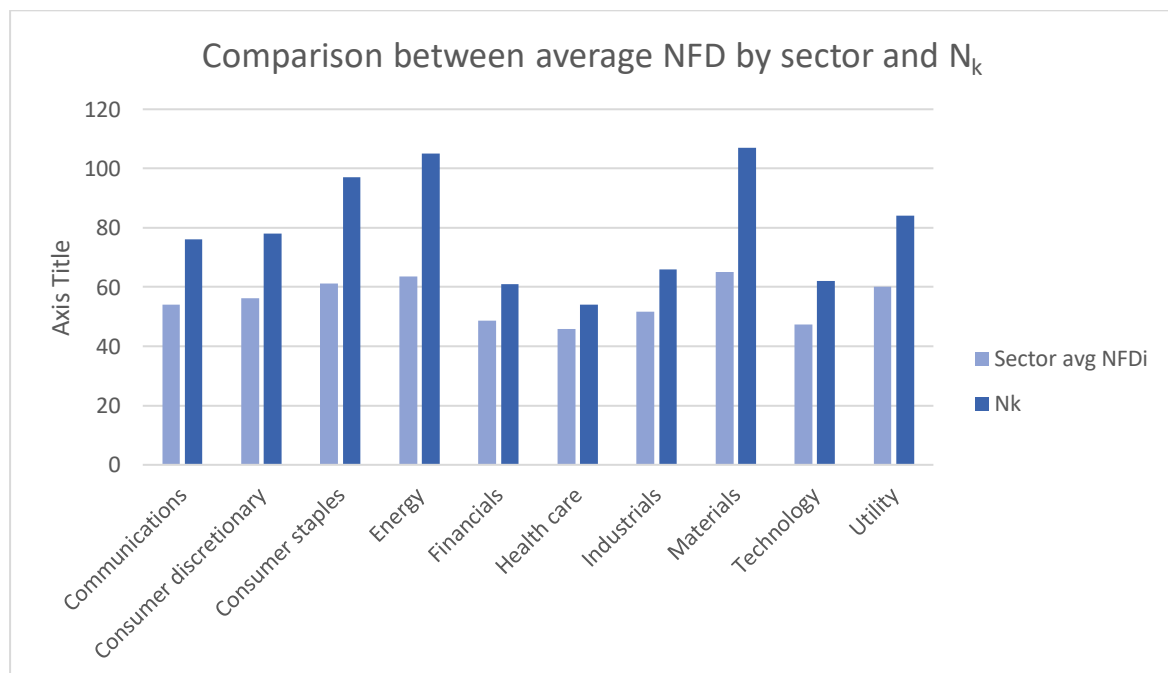


Figure 2: Comparison between average NFD by sector and  $N_k$  (notice that NFD has been multiplied by 100)

In conclusion, under these assumptions, by using  $MNFD_i$  we should be able to filter the effect of the different number of material GRI indicators in different sectors, and thus  $MNFD_i$  should allow us to more correctly evaluate each company and understand the correlation between

non-financial disclosure and other factors (different from the sector to which the firm belongs).

For ease of reading, in the remainder of the work I will refer to the non-financial disclosure score and the material non-financial disclosure score generically as NFD and MNFD respectively, avoiding the index *i*.

## 4.2 Univariate Analysis

We now have two variables with the aim of measuring the extent of the non-financial disclosure of the companies in our sample. Particularly, the variables are named non-financial disclosure score (NFD) and material non-financial disclosure score (MNFD). In this section I will analyse in detail the behaviour of both these variables, even if the dependent variable in the regression model will be MNFD.

### 4.2.1 Summary statistics: Non-financial disclosure score (NFD)

NFD is a variable that, because of how it was designed, is always comprised between 0 and 1. We can normalize it between 0 and 100 for ease of discussion in this descriptive part.

Summary Statistics, using the observations 1 - 331  
for the variable **NFD** (331 valid observations)

<b>Mean</b>	<b>Minimum</b>	<b>Median</b>	<b>Maximum</b>
54.847	7.6389	52.083	97.917
<b>Standard deviation</b>	<b>Coef. Variation</b>	<b>Skewness</b>	<b>Kurtosis</b>
19.419	0.35406	0.19419	2.4757
<b>5% percentile</b>	<b>95% percentile</b>	<b>Interquartile range</b>	<b>Missing obs.</b>
27.222	89.583	27.778	0

Table 36: Summary statistics for NFD

The sample shows data characterized by a minimum value of 7.64 and a maximum of 97.92 (see *table 36*), meaning that no company manages to reach the maximum possible score, so not even one company discloses all GRI indicators among the 144 available. The mean and the median value do not coincide, but neither are excessively different. Data are quite

dispersed around the mean value as shown by the standard deviation of 19.4 and the coefficient of variation of 35.4%.

Comparing to the normal distribution, the kurtosis (2.48) is a bit lower than the one of the normal distribution (3), so there are less outliers compared to the normal. The skewness is 0.19, not too different from the normal distribution (0) and the sample can be considered symmetric.

#### 4.2.2 Summary statistics: Material non-financial disclosure score (MNFD)

Like NFD, also MNFD is always comprised between 0 and 1 (we normalize again from 0 to 100 for the descriptive part). In this case the minimum value is 11.1 (*table 37*), and there are 15 observations that manage to totalize the maximum score of 100.

Summary Statistics, using the observations 1 - 331  
for the variable **MNFD** (331 valid observations)

<b>Mean</b>	<b>Minimum</b>	<b>Median</b>	<b>Maximum</b>
78.322	11.111	81.967	100.00
<b>Standard deviation</b>	<b>Coef. Variation</b>	<b>Skewness</b>	<b>Kurtosis</b>
18.182	0.23215	-1.3098	4.8931
<b>5% percentile</b>	<b>95% percentile</b>	<b>Interquartile range</b>	<b>Missing obs.</b>
40.806	98.905	22.368	0

*Table 37: Summary statistics for MNFD*

The mean and median are not too different, with the median being higher than the mean, oppositely from the behaviour of NFD. The data are still dispersed around the mean but a bit more concentrated than before, with a lower coefficient of variation of 23.2% and a standard deviation of 18.2.

Analysing the kurtosis (4.89), we see now that we will have more outliers if compared to the normal of the NFD case. The skewness is now more evident: the negative value of -1.31 means that the distribution is left skewed, coherently with the fact that the median is higher than the mean. Differently from NFD, MNFD cannot be considered symmetric, and it is very likely to be non-normally distributed.

### 4.2.3 Comparison between NFD and MNFD

To better compare NFD and MNFD it is possible to use a boxplot which, for both the two variables, shows the minimum, the maximum, the median and the 1st and 3rd quartiles (figure 3).

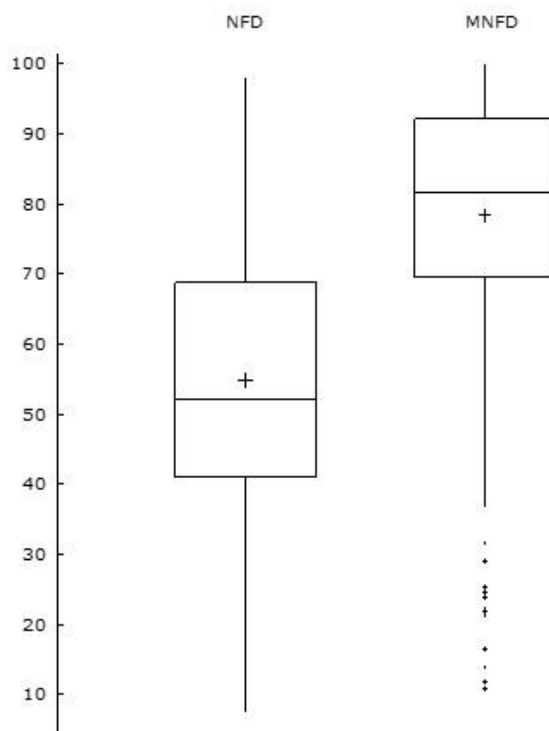


Figure 3: Boxplots for NFD and MNFD

A first relevant thought comes from observing that the 1st quartile of MNFD, 69.7, is higher than the 3rd quartile of NFD, 68.75. The underlying reason is that companies are more likely to disclose information that are material to their sector rather than general non-financial data that maybe are not strictly related to their business. Therefore, companies are more likely to get a higher score when evaluated using the MNFD rather than the NFD. Only 7.6% of companies scored less than 50.

Then, one can notice that the MNFD box is a bit smaller than the NFD one: indeed, the interquartile ranges are 22.4 and 27.8 respectively, with MNFD values being more concentrated around the median than those of NFD. The analysis of NFD and MNFD can be further carried out by decomposing the two score variables by sector (figure 4 and figure 5).



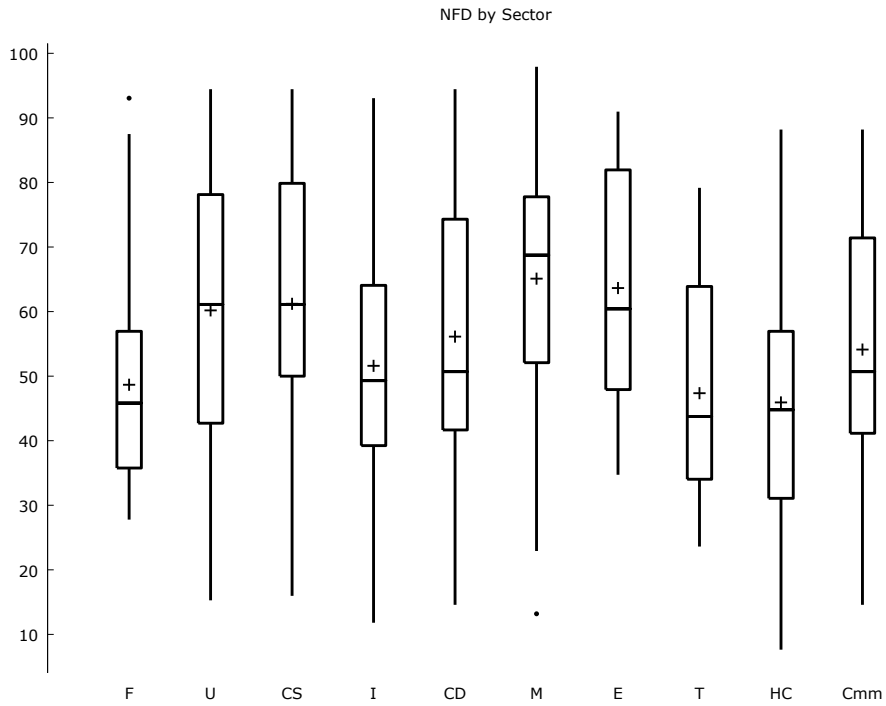


Figure 4: Boxplots of NFD by sector

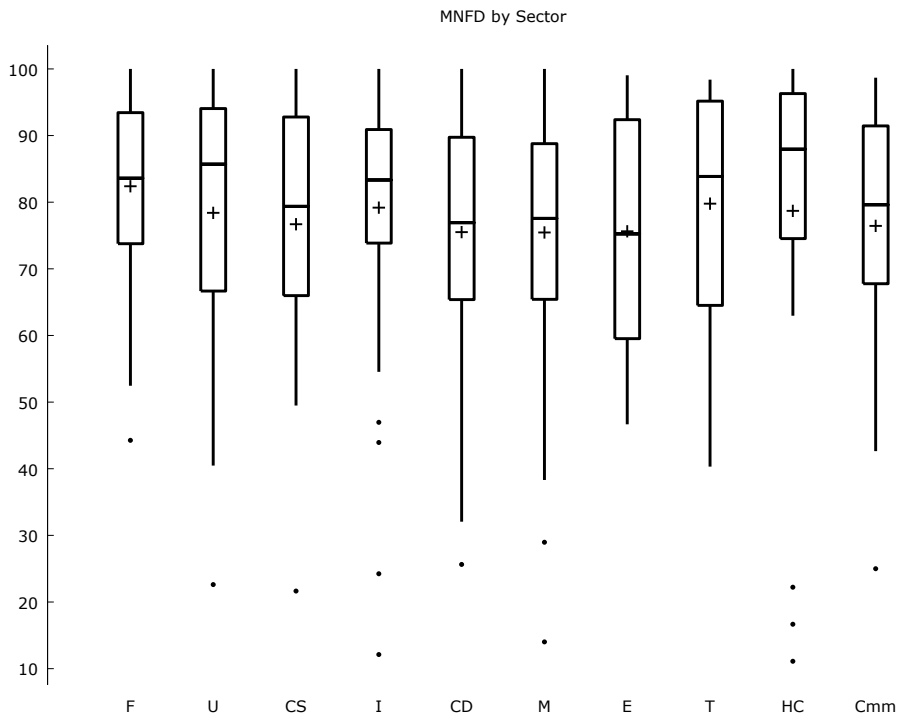


Figure 5: Boxplots of MNFD by sector

Looking at the boxplots, it can be noticed that for each sector the mean, the median, the first and third quartiles are always higher for MNFD rather than for NFD.

For all sectors but one (technology), the MNFD interquartile range is smaller than the NFD one, meaning that data are less dispersed around the median.

The key point is that due to how MNFD is designed, its mean and median do not depend from the sector variable: the results of statistical evidence will be shown later on in this chapter. However, this does not impede to have different standard deviations from sector to sector: the determinants of this variability are at the centre of my research.

Another relevant observation from the MNFD sector factorized boxplots is that the median value is higher than the mean one for all sectors, except the energy one where they coincide, while in the NFD case we do not notice this behaviour: the median is higher than the mean only in two sectors out of ten (utilities and materials).

#### **4.2.4 Normality tests**

A first test that can be conducted on the two independent variables representing the non-financial disclosure score, NFD and MNFD, is the normality test.<sup>17</sup>

Particularly, I will use the following methods: Q-Q plot, graph and Shapiro-Wilk test.

- Q-Q plot: it is a probability plot that can be used as a graphical technique for comparing a data set against a theoretical set. The comparison is done by plotting the quantiles against each others. For my analysis, I will use the “normal probability plot”, a special case of the Q-Q plot, where the theoretical set is the one of the normal distribution. If the plot of the distribution under analysis deviates from the straight line representing the normal distribution, then it means that the data are not likely to be normal.
- Graph: I will support my normality analysis with a graph representing the relative frequency of each of the bins. The shape of the graph can help understanding whether the variable might follow a normal distribution or not.
- Shapiro-Wilk test: it is a statistic test that tests the null hypothesis that a sample of data comes from a normally distributed population. If the p-value of the test is lower than the chosen alpha level (type 1 error), then it is possible to reject the null hypothesis of normal distribution. The Shapiro-Wilk test has been proved to be the most powerful test for normality (Razali and Wah, 2011).

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<sup>17</sup> From now on we go back to the original score between 0 and 1.

Regarding the NFD variable, it is possible to see from the Q-Q plot that the observations are a bit fluctuating around the line representing the normal distribution, with observations in the tails following even less the normal distribution. This is because they get close to the extreme values (0 and 1) but they never reach them or surpass them.

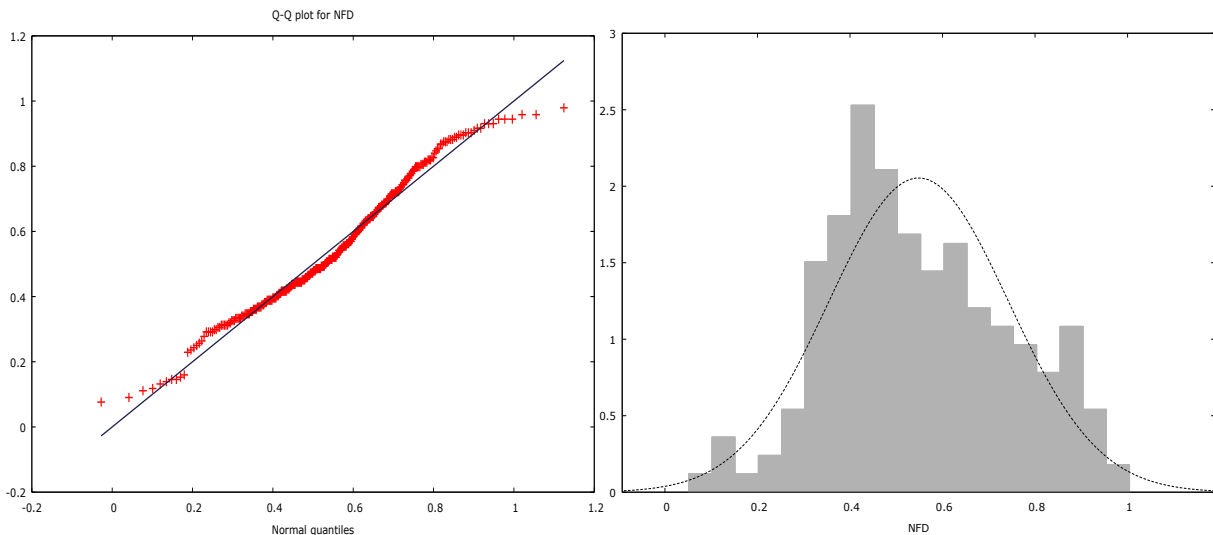


Figure 6: Q-Q plot for NFD and graph of densities across NFD values

By looking at the graph, it seems a bit off compared to the normal distribution (dotted line): the higher densities are in correspondence of NFD values of about 0.4, so a bit to the left compared to the hypothetic normal distribution, and we see a big drop in densities going to the left part of the graph (figure 6).

To get a statistical confirmation of the fact that data are non-normal, I perform a Shapiro-Wilk test:

$$\text{Shapiro - Wilk } W = 0.980277, \quad \text{with } p - \text{value} = 0.000164324$$

Considering the p-value, we can reject the null hypothesis of data normality with strong statistical confidence.

Focusing on the MNFD variable, the Q-Q plot shows even clearer signs of non-normality, with the observations forming a shape well far from the normal distribution line. The graph comparing our distribution to the normal shows a left-skewed behaviour, not compatible with the normal (figure 7).

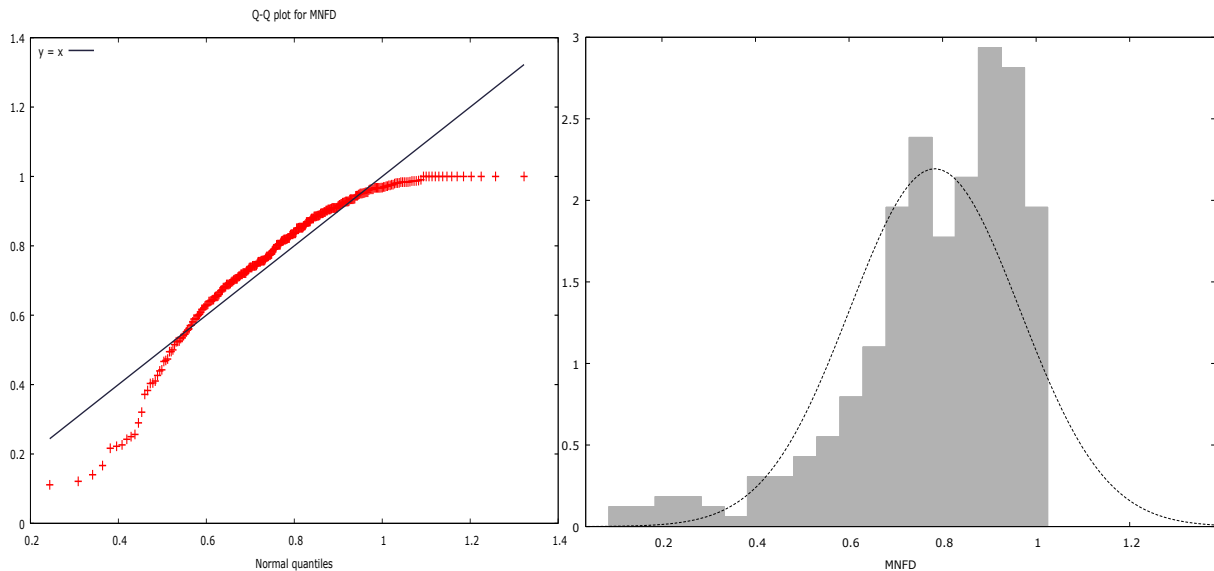


Figure 7: Q-Q plot for MNFD and graph of densities across MNFD values

Indeed, performing a Shapiro-Wilk test we obtain the following results:

$$\text{Shapiro - Wilk } W = 0.891118, \text{ with } p - \text{value} = 1.26009e-014$$

Therefore, we strongly reject the null hypothesis of normality.

Considering that both NFD and MNFD are non-normal we opt to do tests using non-parametric methods such as Kruskal-Wallis and univariate Mann-Whitney tests.

#### 4.2.5 Kruskal-Wallis tests

After having demonstrated that both MNFD and NFD are not normally distributed, I want to understand whether grouping the data either by sector or by country creates samples with statistically significant differences.

In other words, I want to comprehend if companies that belong to a given sector or country might stochastically dominate firms from other sectors or countries. Particularly, I will focus on the analysis of MNFD.

The best method to answer the question is to use a one-way analysis of variance ANOVA model, a statistical test which demonstrates whether the population means of several groups - in my case corresponding to clusters by sector and country - are equal or not. However, the ANOVA is based on the following assumptions that need to hold to provide reliable results:

- Independence of observations
- Normality of residuals

- Homoscedasticity, which means homogeneity of variance of residuals among observations.

Though my observations can be considered independent, samples are not normal – as demonstrated in the previous paragraph - and neither are the residuals obtained from the linear regression of the categorical variables, representing countries and sectors, against the dependent variable MNFD.

The ANOVA model is not very sensitive to moderate deviations from the normal distribution and simulation studies have proved that the type I error ( $\alpha$ ) is not excessively affected by this violation of the assumption (Glass et al. 1972, Harwell et al. 1992, Lix et al. 1996). However, the MNFD sample and its residuals deviate strongly from the normal distribution, therefore it is preferable to use the Kruskal-Wallis test.

The Kruskal-Wallis test, which is the non-parametric equivalent of the ANOVA, performs the same function of the ANOVA but it does not require the normality of data, or of their residuals. The test output is a p-value which should be compared with the chosen  $\alpha$  level: if the p-value is lower, than the Kruskal- Wallis test has proved that at least one group of data stochastically dominates the others.

Should this happen in my analysis, I would then proceed with pairwise Mann-Whitney tests in order to understand, pair by pair, which sample dominates. The expectation is that when observations are clustered by sector, no sample will be predominant since any potential difference attributable to belonging to a sector or to another is already discounted in the MNFD indicator design.

Differently, it can be expected that grouping by country will result in some samples dominating over others, highlighting the differences among countries. With the Kruskal-Wallis test we obtain the following results:

**by sector:** *Kruskal-Wallis U-value = 7.74, df = 9, p - value = 0.561*

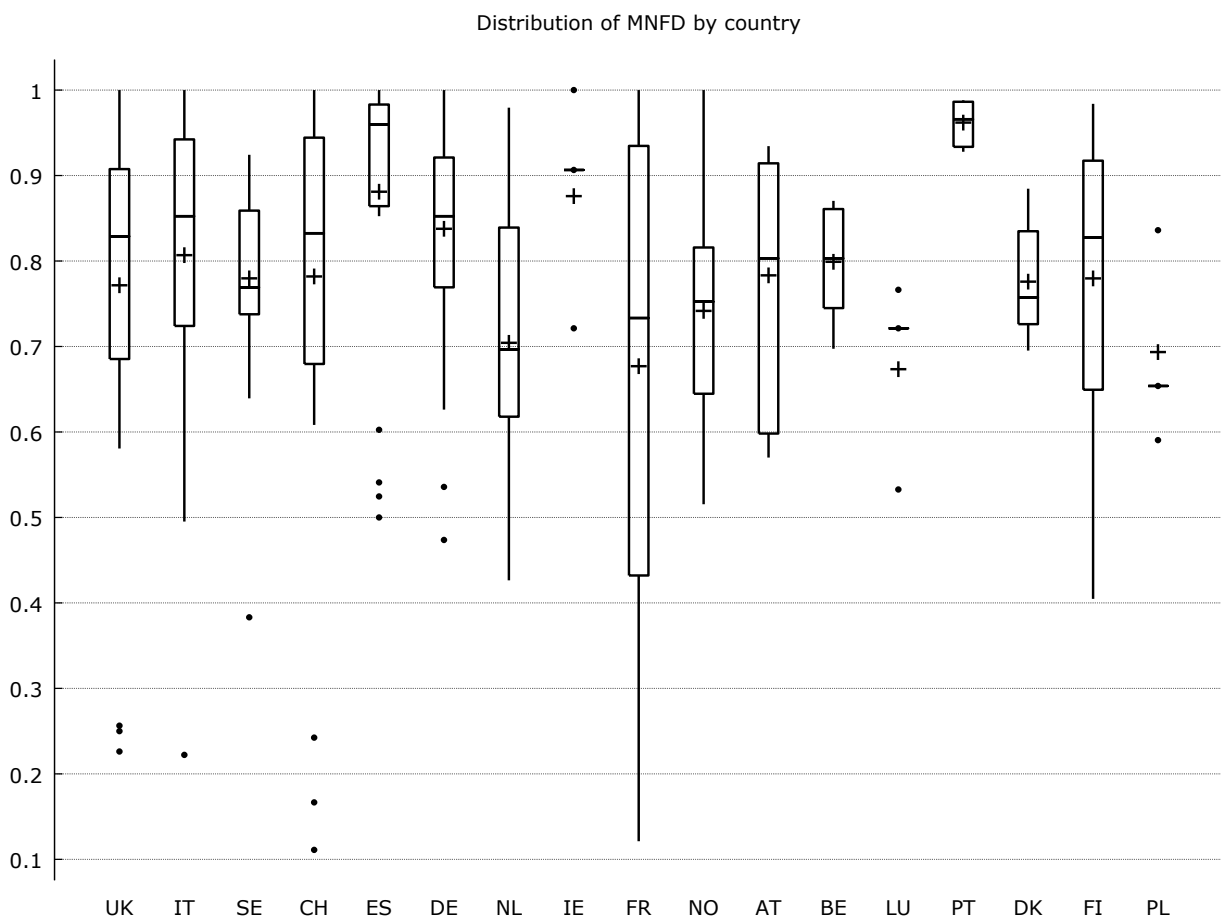
**by country:** *Kruskal-Wallis U-value = 41.33, df = 16, p - value = 0.000*

As expected, considering that for the sector clustering the p-value is 0.561, we can conclude that creating clusters by sector does not lead to any sample of data that statistically has a different median than the others.

On the other hand, clustering by country we reject the null hypothesis, and therefore there will be at least one country with a statistically different median than others.

Now I need to analyse more in depth the behaviour of the different samples created by grouping data by country. The Kruskal-Wallis test only suggests that at least one country has a statistically different median compared to the others: I am now interested in checking which particular country performs differently compared to the others.

To start getting an idea we could see the boxplots of each country in *figure 8*:



*Figure 8: Boxplots of MNFD by country*

We can see how Spain and Portugal seem to perform better than all others, even if the latter is represented by just 4 companies and therefore the significance is very limited.

Another interesting thing is that France has much higher variability than the others (checking the coefficient of variation we have 41%, about double compared to the group of all the others, 0.21), so we could think that France could be taken apart from the rest.

The other countries' behaviours seem quite similar.

To be statistically sure of these conclusions I still need some test, so I perform Mann-Whitney tests for each country; below (table 38 and 39) the tests for the 10 countries out of 17 represented by more than 10 companies are shown (it does not make much sense to comment companies of a certain country compared to the total if the sample is too small).

Mann-Whitney test		
Null hypothesis: the two medians are equal		
	All countries	Finland
Sample size	331	16
Sample median	0.8197	0.8277
W	57687.50	
p-value	0.812	

Mann-Whitney test		
Null hypothesis: the two medians are equal		
	All sectors	France
Sample size	331	34
Sample median	0.8197	0.733
W	61537.50	
p-value	0.053	

Mann-Whitney test		
Null hypothesis: the two medians are equal		
	All countries	Germany
Sample size	331	52
Sample median	0.8197	0.8525
W	62324.50	
p-value	0.098	

Mann-Whitney test		
Null hypothesis: the two medians are equal		
	All sectors	Italy
Sample size	331	34
Sample median	0.8197	0.733
W	61537.50	
p-value	0.053	

Mann-Whitney test		
Null hypothesis: the two medians are equal		
	All countries	Netherlands
Sample size	331	20
Sample median	0.8197	0.6966
W	59320.50	
p-value	0.016	

Mann-Whitney test		
Null hypothesis: the two medians are equal		
	All sectors	Norway
Sample size	331	11
Sample median	0.8197	0.7524
W	57172.00	
p-value	0.209	

Table 38: Different countries MNFD (Finland, France, Germany, Italy, Netherlands, Norway)

Mann-Whitney test		
Null hypothesis: the two medians are equal		
	All countries	Spain
Sample size	331	24
Sample median	0.8197	0.9298
W	57259.50	
p-value	0.001	

Mann-Whitney test		
Null hypothesis: the two medians are equal		
	All sectors	Sweden
Sample size	331	35
Sample median	0.8197	0.7692
W	61465.50	
p-value	0.222	

Mann-Whitney test		
Null hypothesis: the two medians are equal		
	All countries	Switzerland
Sample size	331	36
Sample median	0.8197	0.8326
W	60627.50	
p-value	0.648	

Mann-Whitney test		
Null hypothesis: the two medians are equal		
	All sectors	United Kingdom
Sample size	331	41
Sample median	0.8197	0.8289
W	62002.50	
p-value	0.677	

Table 39: Different countries MNFD (Spain, Sweden, Switzerland, United Kingdom)

Among all, we can see how for Spain the null hypothesis is strongly rejected: Spanish companies tend to disclose more GRI indicators than the overall sample.

For the Netherlands we can say the opposite with 95% confidence: Dutch companies tend to have a lower score on sustainability disclosure.

The other two cases where we see a statistical difference with the overall sample are France and Germany, even if with just 90% confidence. French companies tend to disclose less than the average and German companies tend to disclose more if compared to the overall sample. For the other countries we do not find any significance so we cannot reject the null hypothesis.

Since we noticed that some countries differ from the others, for the multivariate analysis that will be carried on in chapter 5 it could be useful to group some countries, even the ones represented by a low number of companies. We can therefore do some pairwise comparison tests to establish a hierarchy among the median score of the different indices. In the following *table 40* there are the p-values resulting from each Mann-Whitney pairwise test.





#### **4.2.6 Mann-Whitney tests**

In order to study the validity of the hypotheses that I have defined under *Research Questions and Hypotheses*, I begin with some simple univariate tests. Indeed, my approach is to start testing individually the independent variables that I expect to have an impact on company non-financial disclosure (MNFD). Then, I will develop proper linear regression models with multiple dependent and control variables in order to study the combined effect that different determinants can have together and whether the findings from univariate tests are robust to the inclusion of control variables.

The aim of the following tests is to understand if, coherently with my hypotheses, company decisions in terms of signing to the Global Compact or reporting on the SDGs have an impact on the extent of the disclosure. The dependent variable used is the *material non-financial disclosure score* (MNFD) and the non-parametric test that I perform is the Mann-Whitney test that is suitable for non-normal data like MNFD.

##### **4.2.6.1 MNFD vs Global Compact (GC)**

The Global Compact is a corporate sustainability lead by the United Nations. As explained in chapter 1, signatory companies commit to incorporate ten principles within their strategy: the purpose of these principles is to steer the company towards a sustainable and ethical business development taking into consideration, besides the traditional financial aspects, also the areas of human rights, labour, environment and anti-corruption.

I expect that companies adhering to the Global Compact will have a higher non-financial disclosure score. This is because, firstly, signatories of the Global Compact already have to publish the Communication on Progress every year, therefore, their non-financial disclosure process should not come as something new.

Secondly, the adhesion to the Global Compact is voluntary and companies that sign it are likely to do it either because they truly believe in the ten principles or because they just do not want to lag behind other companies. In this last case – that can be considered as an instance of “mimetic pressure”, one of the external pressures which, according to institutional theory, drives companies to act (Tamimi and Sebastianelli, 2017) – companies may not be inclined to release a deep disclosure but differently, in the case which the adherence to the

Global Compact is driven by true commitment, it is plausible to expect that signatory companies will reveal as much non-financial information as possible to stakeholders.

Mann-Whitney test		
Null hypothesis: the two medians are equal		
	GC signatories	Non signatories
Sample size	240	91
Sample median	0.8512	0.7692
W	42187.00	
p-value	0.003	

Table 41: Mann-Whitney test on MNFD for GC signatories vs. non-signatories

Considering the p-value of 0.003 (*table 41*) I reject the null hypothesis and confirm that companies which sign the Global Compact are more inclined to do a more thorough non-financial disclosure.

#### 4.2.6.2 MNFD vs Sustainable Development Goals (SDGs)

The United Nations also have defined 17 Sustainable Development Goals as part of the 2030 Agenda (see *chapter 1*). Companies that pursue actions to advance the SDGs can report their initiatives and results in their reports. The SDGs are characterized by more precise guidelines and indicators if compared to the GC. Reporting on the SDGs expresses a stronger company commitment towards sustainability and non-financial issues. Therefore, I expect that companies which reveal what they have done to pursue the SDGs get a higher MNFD score for at least two reasons: on one side they might be interested in letting stakeholders know that they are truly acting in favour sustainability using the non-financial disclosure as a signalling tool to differentiate them from less committed companies. On the other side, the reporting on the SDGs leads companies to focus also on sustainable issues that might not be strictly material to their business, yet important to the society, thus increasing the extent of the disclosure. We see from *table 42* that again the expectation was statistically proven (95% confidence):

Mann-Whitney test		
Null hypothesis: the two medians are equal		
	SDGs reporters	Not reporting on SDGs
Sample size	292	39
Sample median	0.8333	0.7576
W	49898.00	
p-value	0.011	

Table 42: Mann-Whitney test on MNFD for SDGs reporters vs. non-reporters

## 5 Multivariate analysis

In Chapter 5 the multivariate regression models addressing the four research questions are presented. I display, for each model, descriptive statistics, Pearson and Spearman correlations, and the results of the estimation of the parameters.

### 5.1 Technical aspects of regression models employed for RQ1, 2, 3 and 4

After having carried out univariate tests to develop a first basic knowledge of the impact that Global Compact and SDGs have on the extent of non-financial disclosure, I now test the hypotheses using multivariate regression models.

As discussed in the previous section, the dependent variable MNFD shows clear signs of non-normality, same goes for the residuals of the regression models. Moreover, we have clear problems of heteroskedasticity (i.e. the variability of the dependent variable is not the same across the range of values of the independent variables).

Therefore, another model is needed. Since the dependent variable is a proportion and hence it is confined between 0 and 1, we could think at the beta regression model.

The beta regression model (Ferrari and Cribari-Neto, 2004) is based on the assumption that the dependent variable is beta-distributed and that its mean is related to a set of regressors through a linear predictor with unknown coefficients and a link function. The model also includes a precision parameter which may be constant or depend on a set of regressors through a link function as well.

The model is naturally heteroskedastic and easily accommodates asymmetries, so addressing both problems of my sample.

The beta density can assume a number of different shapes depending on the combination of parameter values, including left- and right-skewed or the flat shape of the uniform density (which is a special case of the more general beta density).

In this case we have a left-skewed distribution. To check if it is beta distributed we can use the Cullen and Frey graph (a skewness-kurtosis plot of the distribution) which plots on the graph the observations in my sample (blue point) on a kurtosis-skewness graph and allows us to compare my distribution to the most common theoretical distributions, also thanks to the bootstrapped values (in orange) (see *figure 9*).

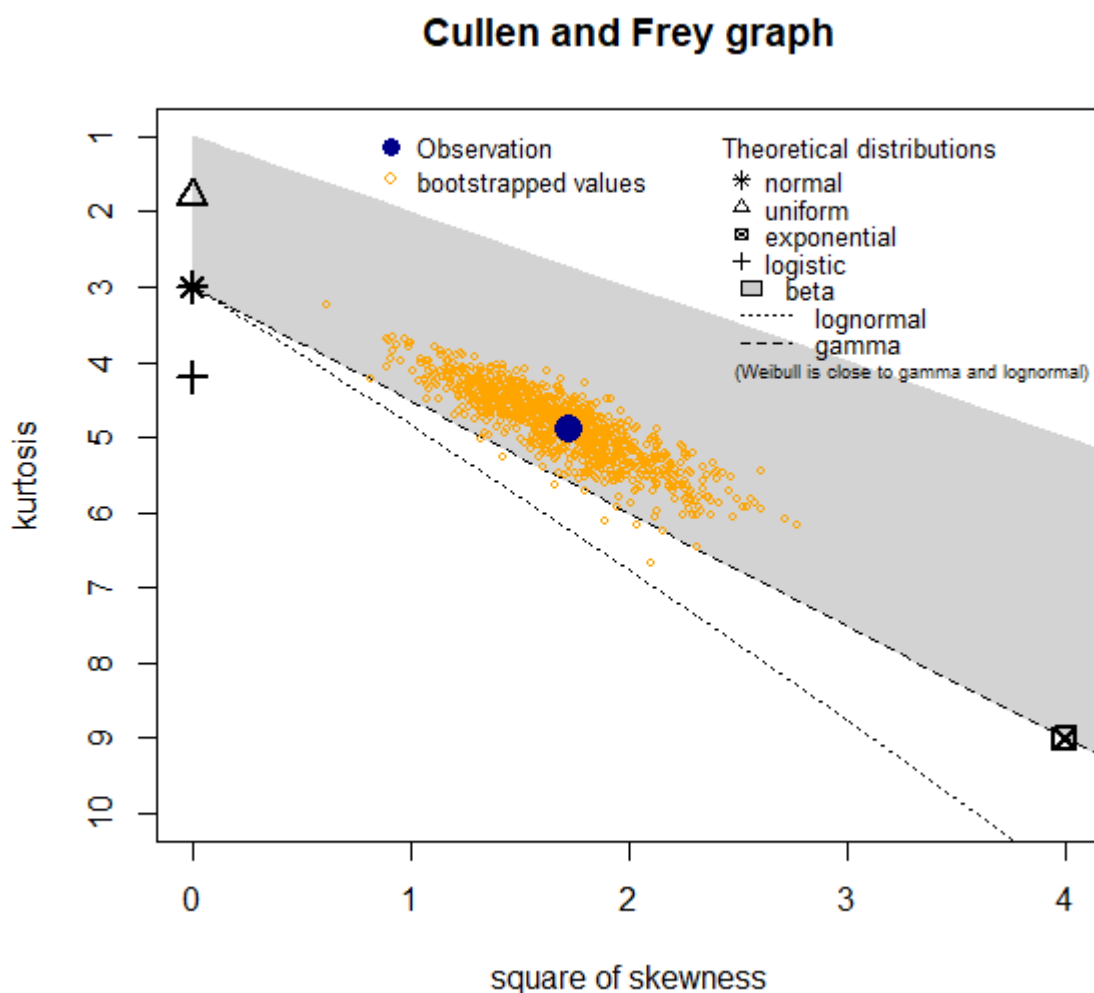


Figure 9: Cullen and Frey graph for MNFD distribution

We can see that the data are indeed beta distributed, so the beta regression model could be useful.

The interpretation of the model is not difficult as it could be in the case of log-transforms of the variable since the parameters of the beta regression are interpretable directly in terms of the mean of the dependent variable.

The only problem is that the beta regression model accepts only values of the dependent variable in the (0,1) interval, and in my case I have multiple observations with the extreme value of 1. We could however transform MNFD; a useful transformation for this case is:

$$y_t = \frac{y \cdot (n - 1) + 0.5}{n}$$

where n is the sample size (Smithson and Verkuilen, 2006).

## 5.2 Research Questions 1 and 2

The first research question is about evaluating whether some sustainability and disclosure related variables have an impact on the completeness of non-financial disclosure. Instead, the second research question aims at verifying a possible impact of firms' ownership characteristics on the disclosure.

To test the two hypotheses, I employ the following models:

$$tMNFD = \beta_0 + \beta_1 GC + \beta_2 SDG + \beta_3 \log EMP + \beta_4 ROE + \beta_5 NETDEBT + \beta_6 CAPEX + \beta_7 GERMANY + \beta_8 IBERIA + \beta_9 NETHERLANDS + \varepsilon$$

$$tMNFD = \beta_0 + \beta_1 LARGESTINV + \beta_2 ISGOV + \beta_3 \log EMP + \beta_4 ROE + \beta_5 NETDEBT + \beta_6 CAPEX + \beta_7 GERMANY + \beta_8 IBERIA + \beta_9 NETHERLANDS + \varepsilon$$

After estimating the two models alone, I will create a third one that merges them. Indeed, with the two separate multivariate regressions I might be able to identify some variables that could have a significant impact on the extent of firms' disclosure. However, with the two models I am separately considering the effects of ownership structure and company's disclosure format decisions: in reality, these two aspects coexist together, and have an impact

on the disclosure at the same time. Therefore, with the creation of a merged model, I can evaluate the robustness of the variables that could turn out to be significant in either one of the two models. Should they be significant also in the third model, then it would be a proof of the robustness of the findings.

The variables in the regressions above are defined as follows:

- tMNF: it is the transformed material non-financial disclosure score (MNF) using the transformation proposed by Smithson and Verkuilen (2006).
- GC: it is a binary variable equal to 1 if the firm is a signatory of the Global Compact; 0 otherwise. Data have been hand-collected (for further details see *chapter 3*).
- SDG: it is a binary variable equal to 1 if the firm reports on the Sustainable Development Goals; 0 otherwise. Data have been hand-collected (for further details see *chapter 3*).
- LARGESTINV: it is a variable that represents the percentage of equity capital owned by the largest shareholder in the company. It can be used as a proxy for ownership concentration. Data have been downloaded from Thomson Reuters Eikon.
- ISGOV: it is a binary variable equal to 1 if the firm is characterized by the presence of a government agency in its equity capital; 0 otherwise. Government agency not only includes the state, but also municipalities and other public administration entities. Data have been downloaded from Thomson Reuters Eikon.

Then, some control variables have been added. Control variables are the result of the preliminary literature review process that I carried out enabling me to define four variables that, according to prior studies, have been shown to be related to the non-financial disclosure. For further details on the choice of control variables see *Determinants of non-financial disclosure* under *chapter 2*.

- logEMP: it is the natural logarithm of the number of full-time equivalent employees of year 2018. Data about the number of full-time equivalents have been downloaded from Thomson Reuters Eikon.
- ROE: it is the total return on equity measured as the ratio of net income and the average equity (2018). The average equity is computed as average between the equity at the beginning of the year and the one at the end of the year. Data have been downloaded from Thomson Reuters Eikon.

- NETDEBT = it is the company net debt (2018) scaled by its total assets (2018). The total net debt is measured as company's total debt less cash and short-term investments. Data have been downloaded from Thomson Reuters Eikon.
- CAPEX = it is the ratio between the company capital expenditure (2018) and its total assets. Capital expenditure is computed considering the sum of purchase or acquisition of fixed assets, intangibles and software development for the year. Data have been downloaded from Thomson Reuters Eikon.

*Table 43* presents descriptive statistics on dependent and independent variables.

<b>Variables</b>	<b>Mean</b>	<b>St.Dev.</b>	<b>Minimum</b>	<b>Q1</b>	<b>Median</b>	<b>Q3</b>	<b>Maximum</b>
MNFD	0.7832	0.1818	0.1111	0.69737	0.81967	0.92105	1.0000
tMNFD	0.7824	0.1813	0.1123	0.69677	0.81871	0.91978	0.9985
GC	0.7251	0.4472	0.0000	0.0000	1.0000	1.0000	1.0000
SDG	0.8822	0.3229	0.0000	1.0000	1.0000	1.0000	1.0000
LARGESTINV	20.501	17.751	0.570	6.920	12.290	29.230	90.000
ISGOV	0.2719	0.4456	0.0000	0.0000	0.0000	1.0000	1.0000
logEMP	9.8643	1.6639	2.9957	9.0791	9.9656	11.0276	13.407
ROE	14.942	16.265	-24.530	7.425	13.025	19.195	174.65
NETDEBT	15.55	19.24	-32.34	1.39	13.69	27.84	98.54
CAPEX	3.852	3.332	0.006	1.395	3.230	5.579	19.032

*Table 43: Summary statistics on variables for RQ1 and RQ2*

We can see how close the transformed variable, tMNFD, is to the original variable MNFD.

The largest investor, on average, owns the 20.5% of the company shares; we have a high variation around the mean though (86.6%). There are just 2 companies where the largest investor owns more than 80% of the shares, and there are 127 firms with less than 10% of shares owned by the largest investor. So there is big variation but the data is quite concentrated, with the third quartile at just 29.2%.

The government, or a state entity, is present in about 27% of the companies.

In the following *tables 44 and 45* I present Pearson and Spearman correlation coefficients for the variables of the model. I present both since, given the non-normality of MNFD, Spearman correlation might be more appropriate to evaluate the correlation between this variable and the others. Values in bold are significant at least at a 5% level.



<b>Pearson</b>	MNFD	tMNFD	GC	SDG	LARGESTINV	ISGOV	logEMP	ROE	NETDEBT
tMNFD	<b>1.000</b>								
GC	<b>0.126</b>	<b>0.126</b>							
SDG	<b>0.157</b>	<b>0.157</b>	<b>0.552</b>						
LARGESTINV	-0.093	-0.093	<b>-0.137</b>	-0.019					
ISGOV	-0.007	-0.007	<b>0.163</b>	<b>0.118</b>	0.079				
logEMP	<b>0.119</b>	<b>0.119</b>	<b>0.247</b>	<b>0.272</b>	-0.067	-0.013			
ROE	-0.104	-0.104	-0.081	-0.011	-0.064	-0.093	0.030		
NETDEBT	0.004	0.004	0.011	-0.018	0.012	0.096	<b>-0.188</b>	0.098	
CAPEX	-0.079	-0.079	-0.023	0.080	<b>0.134</b>	0.050	0.017	<b>0.143</b>	<b>0.136</b>

Table 44: Pearson correlation matrix on variables for RQ1 and RQ2

<b>Spearman</b>	MNFD	tMNFD	GC	SDG	LARGESTINV	ISGOV	logEMP	ROE	NETDEBT
tMNFD	<b>1.000</b>								
GC	<b>0.166</b>	<b>0.166</b>							
SDG	<b>0.140</b>	<b>0.140</b>	<b>0.552</b>						
LARGESTINV	-0.095	-0.095	<b>-0.140</b>	-0.028					
ISGOV	-0.044	-0.044	<b>0.163</b>	<b>0.118</b>	<b>0.108</b>				
logEMP	<b>0.166</b>	<b>0.166</b>	<b>0.266</b>	<b>0.273</b>	<b>-0.188</b>	-0.030			
ROE	-0.073	-0.073	-0.106	-0.073	-0.003	-0.042	-0.074		
NETDEBT	0.004	0.004	-0.003	-0.035	-0.000	0.085	<b>-0.154</b>	0.039	
CAPEX	-0.066	-0.066	0.010	<b>0.130</b>	<b>0.179</b>	0.063	0.032	<b>0.214</b>	<b>0.148</b>

Table 45: Spearman correlation matrix on variables for RQ1 and RQ2

Comparing the column regarding the correlations with the MNFD with the column of the correlations with tMNFD we can see that they coincide, since the transformation was linear. There are some differences in variables correlation comparing Pearson and Spearman correlation coefficients. Size, measured as logEMP, is the variable that is more correlated to the others, both considering Pearson and Spearman. However, in the Spearman case also the correlation with LARGESTINV becomes significant; it is a negative correlation. The larger is a firm the smaller is the stake in the hands of the largest shareholder. As expected after having analyzed previous research studies, the size is positively correlated with the extent of non-financial disclosure MNFD. Size is also positively correlated with GC and SDG. MNFD is positively correlated with both GC and SDG, either using Pearson or Spearman indexes. The presence of the government, ISGOV, is positively correlated with SDG and GC, possibly indicating that state agencies are more likely to invest in companies that care about

sustainability issues, fact that could be signaled by signing the Global Compact or by reporting on the SDGs. The profitability of the firm, expressed by the ROE, is not correlated with any variable.

The results of the beta regressions are presented in *table 46*.

tMNFD	Model 1		Model 2		Model 3	
	Coeff	z-score p-value	Coeff	z-score p-value	Coeff	z-score p-value
const	-0.04277	-0.129 0.89732	0.20303	0.599 0.5491	0.07592	0.224 0.82298
GC	0.10254	0.747 0.45501			0.06476	0.461 0.64501
SDG	0.41077**	2.218 0.02657			0.43883**	2.369 0.01783
LARGESTINV			-0.00575**	-1.972 0.0486	-0.00515*	-1.752 0.07983
ISGOV			-0.02581	-0.219 0.8264	-0.06727	-0.564 0.57287
logEMP	0.09627***	2.841 0.00449	0.12578***	3.923 8.74e-05	0.09616***	2.838 0.00454
ROE	-0.00525*	-1.715 0.08637	-0.00655**	-2.115 0.0344	-0.00596*	-1.933 0.05322
NETDEBT	0.00331	1.192 0.23341	0.00354	1.258 0.2084	0.00360	1.292 0.19633
CAPEX	-0.02920*	-1.857 0.06336	-0.01863	-1.167 0.2432	-0.02393	-1.510 0.13105
GERMANY	0.29909**	2.060 0.03937	0.21537	1.467 0.1423	0.27541*	1.876 0.06070
IBERIA	0.78043***	3.970 7.2e-05	0.82021***	4.171 3.03e-05	0.81853***	4.108 3.99e-05
NETHERLANDS	-0.42566**	-2.077 0.03777	-0.40705*	-1.958 0.0502	-0.46029**	-2.225 0.02608
Pseudo R <sup>2</sup>	0.1452		0.1379		0.1542	
Log-likelihood	200.1		197.5		201.8	
Akaike criterion	-378.22		-372.94		-377.57	
Bayesian criterion	-336.66		-331.38		-328.46	
Sample size	323		323		323	

Table 46: Regression results for RQ1 and RQ2

The results reported for the first model show that the fact that a company reports on the Sustainable Development Goals is a significant determinant of that company disclosure extent. Particularly, looking at the estimate of SDG coefficient we can see that it is significantly

positive with 95% confidence (p-value of 0.026), so the expectation has been met: when a company reports on the Sustainable Development Goals tends to include a higher amount of non-financial information compared to companies which do not report on these UN goals.

This happens possibly because companies reporting on SDGs are truly committed to sustainability – considered that reporting to SDGs is totally voluntary - and, therefore, want to let stakeholders know their position. Moreover, the SDGs shed light on less reported and material sustainable topics.

The other variable of interest for this model, GC, does not have a statistically significant coefficient. Therefore, we can conclude that whether a firm signs the United Nations Global Compact or not does not affect the extent of companies' disclosure.

The results reported in *table 46* for the second model show that LARGESTINV has a significant impact on tMNFD (p-value of 0.049), negative as expected: as the ownership concentration increases the extent of the non-financial disclosure decreases.

Focusing on control variables, in both models there is a positive relation between size of the company and disclosure: this is not surprising since it has already been widely acknowledged in several previous research studies; differently, the firm profitability has in both cases a significant negative impact on the sustainability disclosure. This is surprising and goes against the expectations. The CAPEX shows a significant negative correlation with the disclosure only in the first model and just at a 10% significance level.

Net debt does not seem to affect significantly the extent of the non-financial disclosure.

In the third regression, the previous variables are combined in a single model to test their robustness.

The SDG variable remains significant and the estimated coefficient is still positive with a 5% confidence level ( $p = 0.0179$ ) and the GC variable remains non-significant.

The ownership concentration has again a significant negative impact, but now just at a 10% significance level (p-value of 0.0798), while the presence of a government entity in the shareholders' structure remains non-significant.

The negative relation between the size of the largest shareholder and the non-financial disclosure is coherent with my expectations and with previous studies: according to agency theory, when ownership is more concentrated, the potential for conflicts between principals and agents is lower and information disclosure becomes less important as a monitoring tool since principals can more closely control agents (Jensen and Meckling, 1976). Furthermore,

large shareholders may also have access to information through other channels different from disclosure (see *Literature review* for more details). The lack of a relationship between the presence of a government agency in the shareholder structure and the extent of non-financial disclosure goes against both prior research studies and my expectations: despite I did not formulate a hypothesis on the sign of the relation, I expected it to be present. However, further analysis might be done focusing not only on the presence of the government but also on the extent of such a presence.

Concerning control variables, the relation on size is confirmed in sign and significance. ROE has now a negative impact just at a 10% significance level, and CAPEX coefficient lost any significance that it was shyly showing in the first model. Net debt is still non-significant. Looking at the country binary variables, it is clear that the companies in the Iberic group show a significant positive difference in disclosure compared to the constant (that in the model represents all other countries except Germany and the Netherlands): the coefficient estimate of the variable IBERIA can be considered robust since in all the three models is statistically significant at the 1% level.

The pseudo  $R^2$  of around 15% signals that with these models we are able to predict only 15% of the variability of the dependent variable<sup>18</sup>, but since we are doing inference this is not so important, it is important to understand which variables affect MNFD and with which sign.

As shown under *Univariate analysis*, before estimating regression models I performed some univariate tests to understand the impact of GC and SDG variables on the extent on non-financial disclosure. It is interesting to compare the results from univariate tests with those from regressions (*table 47*).

	Univariate test	Model 1	Model 3
GC	Positive***	Non-significant	Non-significant
SDG	Positive**	Positive**	Positive**

*Table 47: Univariate vs multivariate analysis results for GC and SDG*

The SDG variable is very robust since in all three analyses have a significant positive impact on the extent of non-financial disclosure with the same confidence of 95%. GC on the other

<sup>18</sup> The pseudo  $R^2$  is the one suggested by Ferrari & Cribari-Neto (2004) for beta regressions.

hand is significant only in the univariate Mann-Whitney test and not in the multivariate regression models, so it is not robust to the inclusion of other variables.

## 5.3 Research questions 3 and 4

In this section, I present the results for research questions 3 and 4.

### 5.3.1 Descriptive statistics

The variables used in RQ3 and RQ4 are defined as follows:

- MNFD is the material non-financial disclosure score described in the relevant section.
- tMNFD is the same transformed variable as before.
- BOARDSIZE: total number of board members at the end of the fiscal year.
- CEODUALITY: dummy variable taking value of 1 if the CEO is simultaneously chairman of the board or the chairman of the board has been CEO of the company, 0 otherwise.
- COMMITTEE: dummy variable which takes value of 1 if the company has a CSR committee on the board of directors, 0 otherwise.
- INCENTIVE: dummy variable which is equal to 1 if the company senior executive's compensation is linked to CSR or sustainability targets, 0 otherwise.
- GENDER: percentage of women in the board of directors at the end of the year.
- SPSKILLS: percentage of board members who have either an industry specific background or a strong financial background at the end of the year.
- INDEPMEM: percentage of independent board members, as reported by the company, at the end of the fiscal year.
- AVGTENURE: average number of years each board member has been on the board.
- ESGSCORE: Overall company sustainability score computed by Thomson Reuters Eikon and based on environmental, social and corporate governance (ESG) performances reported by the company. This can be decomposed in E, S, and G scores.
- ESCORE: environmental pillar score computed by Thomson Reuters Eikon. It measures a company's impact on the environment: living and non-living natural systems, including the air, land and water, as well as complete ecosystems. It reflects how well a company uses best management practices to avoid environmental risks and capitalize on environmental opportunities.

- **SSCORE:** social pillar score computed by Thomson Reuters Eikon. It measures a company's social impact (e.g. capacity to generate trust and loyalty with its workforce, customers and society) through its use of best management practices. It is a reflection of the company's reputation and the health of its license to operate, which are key factors in determining its ability to generate long term shareholder value.
- **GSCORE:** government pillar score computed by Thomson Reuters Eikon. It measures a company's systems and processes, which ensure that its board members and executives act in the best interests of its long-term shareholders. It reflects a company's capacity, through its use of best management practices, to direct and control its rights and responsibilities through the creation of incentives, as well as checks and balances.
- **CONTRSCORE:** ESG controversies score computed by Thomson Reuters Eikon which measures a company's exposure to environmental, social and governance controversies and negative events reflected in global media. A higher score corresponds to a lower exposure.
- **logEMP, ROA, NETDEBT, CAPEX:** control variables in my models as they have been defined in the previous section.

All variables are related to fiscal year 2018. *Table 48* presents descriptive statistics on dependent and independent variables.

Variable	Mean	StDev	CoefVar	Minimum	Q1	Median	Q3	Maximum
MNFD	0.78322	0.18182	23.21	0.11111	0.69737	0.81967	0.92105	1.00000
tMNFD	0.78236	0.18127	23.17	0.11229	0.69677	0.81871	0.91978	0.99849
BOARDSIZE	11.505	3.758	32.67	3.000	9.000	11.000	13.000	22.000
CEODUALITY	0.2417	0.4288	177.40	0.0000	0.0000	0.0000	0.0000	1.0000
COMMITTEE	0.8831	0.3218	36.44	0.0000	1.0000	1.0000	1.0000	1.0000
INCENTIVE	0.2394	0.4274	178.52	0.0000	0.0000	0.0000	0.0000	1.0000
GENDER	31.759	11.084	34.90	0.000	25.000	33.330	40.000	62.500
SPSKILLS	35.98	18.89	52.51	0.00	21.43	35.71	50.00	87.50
INDEPMEM	65.05	24.57	37.77	0.00	50.00	66.67	84.62	100.00
AVGTENURE	6.344	2.669	42.07	0.250	4.700	5.750	7.790	16.450
ESGSCORE	71.483	12.001	16.79	8.260	65.120	73.055	80.115	95.740
ESCORE	77.101	15.058	19.53	4.510	69.150	79.040	88.787	99.490
SSCORE	74.559	15.142	20.31	10.400	65.523	77.505	85.803	98.710
GSCORE	61.95	20.19	32.60	7.66	45.87	65.46	77.71	97.39
CONTRSCORE	32.68	26.60	81.39	0.08	6.23	20.02	59.83	72.22
logEMP	9.8643	1.6639	16.87	2.9957	9.0791	9.9656	11.0276	13.4068
ROE	14.942	16.265	108.86	-24.530	7.425	13.025	19.195	174.650
NETDEBT	15.55	19.24	123.74	-32.34	1.39	13.69	27.84	98.54
CAPEX	3.852	3.332	86.51	0.006	1.395	3.230	5.579	19.032

Table 48: Summary statistics on variable for RQ3 and RQ4

Most companies in the sample have a CSR committee in the board of directors (88%), while few companies appear to have sustainability incentives at executive level (24% of companies in the sample).

The separation of the roles of CEO and chairman is prevalent, with only the 24% of companies that have (or had in the past) an executive chairman.

Board size varies between 3 and 22 with very close average and median, around 11 members. Half of the companies have a board size between 9 (first quartile) and 13 (third quartile), so this variable appears to be a bit concentrated.

ESG scores vary between 8.26 and 95.74, although 50% of companies have a score between about 65 (1st quartile) and 80 (3rd quartile), with the average score of 71 being slightly below the median. Among the three scores which compose the ESG score the lowest of the three is the one about the governance pillar, with a mean of roughly 62, while the environmental and social pillar have a similar mean and median of around 14 points more. It seems that the companies struggle a bit to perform in good governance.

ESG controversy score varies between 0.08 and 72.22 with an interquartile range of 53.60 and a coefficient of variation of 81%. There is considerably more variability among the sample companies in this variable than in the ESG scores.

*Table 49* shows both the Pearson and Spearman correlation coefficient for the variables. I present both since, given the non-normality of MNFD, Spearman correlation might be more appropriate to evaluate the correlation between this variable and the others. Values presented in bold are significant at least at a 5% level.



PEARSON	MNFD	BOARDSIZE	CEODUALITY	COMMITTEE	INCENTIVE	GENDER	SPSKILLS	INDEPMEM	AVGTENURE	ESGSCORE	ESCORE	SSCORE	GSCORE	CONTRSCORE	logEMP	ROE	NETDEBT
BOARDSIZE	<b>0.209</b>																
CEODUALITY	-0.081	0.028															
COMMITTEE	0.072	<b>0.186</b>	0.003														
INCENTIVE	0.004	0.042	-0.019	<b>0.135</b>													
GENDER	-0.020	0.087	-0.029	-0.058	0.016												
SPSKILLS	-0.060	<b>-0.148</b>	0.079	-0.006	0.097	-0.105											
INDEPMEM	0.038	<b>-0.221</b>	-0.103	<b>0.112</b>	<b>0.128</b>	0.042	0.039										
AVGTENURE	-0.081	-0.063	<b>0.309</b>	-0.098	-0.068	<b>-0.165</b>	0.003	<b>-0.190</b>									
ESGSCORE	<b>0.201</b>	<b>0.224</b>	-0.008	<b>0.277</b>	<b>0.257</b>	<b>0.152</b>	0.100	<b>0.284</b>	<b>-0.151</b>								
ESCORE	<b>0.131</b>	<b>0.234</b>	0.039	<b>0.204</b>	<b>0.153</b>	<b>0.154</b>	0.072	0.102	-0.014	<b>0.728</b>							
SSCORE	<b>0.197</b>	<b>0.280</b>	0.072	<b>0.259</b>	0.102	-0.019	-0.048	0.028	-0.076	<b>0.755</b>	<b>0.457</b>						
GSCORE	0.078	-0.019	<b>-0.109</b>	<b>0.156</b>	<b>0.306</b>	<b>0.169</b>	<b>0.177</b>	<b>0.465</b>	<b>-0.233</b>	<b>0.687</b>	<b>0.192</b>	<b>0.250</b>					
CONTRSCORE	-0.033	<b>-0.302</b>	0.058	-0.094	<b>-0.143</b>	-0.025	-0.087	-0.039	-0.010	<b>-0.305</b>	<b>-0.225</b>	<b>-0.250</b>	<b>-0.171</b>				
logEMP	<b>0.119</b>	<b>0.353</b>	0.076	<b>0.215</b>	<b>0.161</b>	0.030	-0.068	0.013	0.068	<b>0.362</b>	<b>0.279</b>	<b>0.348</b>	<b>0.182</b>	<b>-0.397</b>			
ROE	-0.104	<b>-0.137</b>	0.011	0.022	0.008	0.013	<b>0.163</b>	0.019	0.052	0.051	-0.022	0.061	0.066	0.100	0.030		
NETDEBT	0.004	-0.071	-0.064	0.037	0.053	0.056	0.067	0.023	<b>-0.143</b>	-0.027	-0.100	<b>-0.107</b>	<b>0.134</b>	-0.009	<b>-0.188</b>	0.098	
CAPEX	-0.079	-0.043	-0.019	0.054	0.067	-0.013	<b>-0.130</b>	-0.006	-0.013	-0.043	<b>-0.129</b>	-0.014	0.024	0.069	0.017	<b>0.143</b>	<b>0.136</b>

Table 49: Pearson and Spearman correlation matrix of variables for RQ3 and RQ4

SPEARMAN	MNFD	BOARDSIZE	CEODUALITY	COMMITTEE	INCENTIVE	GENDER	SPSKILLS	INDIPMEM	AVGTENURE	ESGSCORE	ESCORE	SSCORE	GSCORE	CONTRSCORE	logEMP	ROE	NETDEBT
BOARDSIZE	<b>0.282</b>																
CEODUALITY	0.008	0.044															
COMMITTEE	<b>0.141</b>	<b>0.202</b>	0.003														
INCENTIVE	0.015	0.056	-0.019	<b>0.135</b>													
GENDER	-0.049	0.071	0.005	-0.069	0.004												
SPSKILLS	-0.073	<b>-0.137</b>	0.079	-0.011	0.088	-0.103											
INDEPMEM	0.013	<b>-0.233</b>	<b>-0.114</b>	0.101	<b>0.116</b>	-0.011	0.039										
AVGTENURE	-0.061	-0.015	<b>0.325</b>	-0.100	-0.049	<b>-0.128</b>	-0.012	<b>-0.135</b>									
ESGSCORE	<b>0.231</b>	<b>0.226</b>	-0.010	<b>0.278</b>	<b>0.273</b>	0.104	0.075	<b>0.272</b>	-0.058								
ESCORE	<b>0.179</b>	<b>0.264</b>	0.035	<b>0.210</b>	<b>0.144</b>	0.088	0.031	0.070	0.037	<b>0.670</b>							
SSCORE	<b>0.234</b>	<b>0.267</b>	0.088	<b>0.242</b>	0.098	-0.055	-0.075	0.024	-0.013	<b>0.722</b>	<b>0.417</b>						
GSCORE	0.064	-0.015	<b>-0.101</b>	<b>0.165</b>	<b>0.330</b>	<b>0.146</b>	<b>0.194</b>	<b>0.451</b>	<b>-0.141</b>	<b>0.680</b>	<b>0.140</b>	<b>0.226</b>					
CONTRSCORE	-0.090	<b>-0.264</b>	0.053	-0.084	<b>-0.140</b>	0.019	-0.072	-0.046	0.010	<b>-0.347</b>	<b>-0.252</b>	<b>-0.257</b>	<b>-0.206</b>				
logEMP	<b>0.166</b>	<b>0.360</b>	0.076	<b>0.185</b>	<b>0.147</b>	0.058	-0.042	0.027	0.078	<b>0.424</b>	<b>0.301</b>	<b>0.364</b>	<b>0.229</b>	<b>-0.446</b>			
ROE	-0.073	<b>-0.237</b>	0.034	-0.029	-0.013	-0.022	0.046	-0.008	0.084	-0.011	-0.094	0.040	-0.011	<b>0.215</b>	-0.074		
NETDEBT	0.004	-0.070	-0.044	0.069	0.038	0.088	0.056	0.048	-0.104	-0.082	<b>-0.153</b>	-0.103	0.092	0.001	<b>-0.154</b>	0.039	
CAPEX	-0.066	-0.012	-0.015	0.078	0.093	0.008	<b>-0.158</b>	-0.014	-0.003	0.001	<b>-0.114</b>	0.052	0.028	<b>0.138</b>	0.032	<b>0.214</b>	<b>0.148</b>

Positive correlations with the dependent variable appear in both Pearson and Spearman coefficients for board size, ESG score, in particular two of the components of ESG score as well, and size (as we saw before). The Spearman correlation shows also a positive correlation between the dependent variable and the fact that the company has a CSR committee: as expected the companies with a CSR committee are more inclined to sustainability disclosure. The correlation of MNFD with ESG score shows that a company disclosing more on average performs better than others. Board size as well has a positive relation with the dependent variable.

Differently from what was expected, there appears to be no correlation between disclosure and each of these variables: incentives, gender diversity, specific skills and independent board members.

As expected, size is correlated to board size, meaning that large companies tend to have larger boards. Size is also positively correlated to the existence of a CSR committee and to incentives. Interestingly, ESG score is positively associated with size, while controversy scores are negatively correlated to size, with one of the highest coefficients found in the matrix. This may be a good qualitative and intuitive indication that large companies, due to their higher visibility and exposure, tend to face more controversies.

ESG score is also positively correlated with the percentage of independent board members, as expected, and, interestingly, with gender diversity (Pearson coefficients): it appears that a higher percentage of female board members helps to achieve a higher ESG score.

Other positive correlations with ESG score come from the presence of a CSR committee on the board and from the existence of incentives, as could be expected. Incentives appear to be correlated also with the controversies score, this time a negative way, which is reasonable since with incentives the senior executives are more likely to pay more attention to possible controversies that could arise.

ESG score, on the other hand, is negatively correlated with the average board tenure (in the case of Pearson correlation): A board too static in its members composition could be counterproductive in terms of ESG performance.

The profitability, measured by ROE, appears to be significantly correlated with board size (negatively) and with CAPEX (positively), and in one case with controversies score or with board specific skills (both positively). Firms with higher controversies scores tend to be more

profitable than others; same goes for specific skills in the board (industry-specific and financial).

CEO duality does not appear to be correlated with sustainability variables but just with other governance variables.

It is interesting to notice how the components of the ESG score, i.e. E, S, and G scores, are significantly correlated with each other: a company paying attention to its ESG performance is more inclined to pay attention to all three pillars and not just to one or two.

### 5.3.2 Research question 3

Given the formulation of the hypothesis and the variables defined, research question 3 takes the following form:

$$tMNFD = \beta_0 + \beta_1 ESGSCORE + \beta_2 CONTRSCORE + \beta_3 \log EMP + \beta_4 ROE + \beta_5 NETDEBT + \beta_6 CAPEX + \beta_7 GERMANY + \beta_8 IBERIA + \beta_9 NETHERLANDS + \varepsilon$$

In this model, the ESG score and the ESG controversies scores are used as proxies for the sustainability performance of the company. I include the controversies score since controversies, and the ensuing pressures, may be an important factor in determining disclosure, especially assuming the legitimacy theory point of view. The goal of the model is to establish whether there is a relation between sustainability performance and disclosure and, if there is, the sign of this relation. Specifically, I investigate whether better sustainability performers disclose more to signal their superior performance, as suggested by voluntary disclosure theory, or worse performers disclose more to obtain a legitimizing effect, as suggested by legitimacy theory (see *Literature review* for the description of these theories and prior empirical works).

*Table 50* shows the results of the regression performed using the beta regression.

<i>Dependent variable tMNF</i>			Model 4
	<i>Coefficient</i>	<i>z-score</i>	<i>p-value</i>
const	-1.11207	-2.588	0.009652 ***
ESGSCORE	0.01663	3.814	0.000136 ***
CONTRSCORE	0.004838	2.206	0.027394 **
logEMP	0.10816	2.971	0.002964 ***
ROE	-0.00587	-1.944	0.051953 *
NETDEBT	0.00373	1.343	0.179374
CAPEX	-0.02332	-1.343	0.136188
GERMANY	0.25861	1.809	0.070499 *
IBERIA	0.80797	4.159	3.19e-05 ***
NETHERLANDS	-0.39087	-1.920	0.054884 *
Pseudo R <sup>2</sup>		0.1713	
Log-likelihood		202.1	
Akaike criterion		-382.30	
Bayesian criterion		-340.88	
Sample size		319	

*Table 50: Regression results for RQ3*

The results of the model show a positive relation of the non-financial disclosure score with both ESGSCORE and CONTRSCORE.

In the first case the significance is very strong, in the second it is a 5% significance. These results confirm the expectations and provide evidence in favour of voluntary disclosure theory (Verrecchia, 1983; Dye, 1985; Clarkson et al., 2008) and seem to go against legitimacy theory (Deegan, 2002), since better sustainability performers appear to disclose more extensively.

Most prior studies have found mixed evidence on the relation between sustainability performance and disclosure, with some researchers finding positive relations and some finding negative relations. This has been attributed by some authors to the different methodologies used in the studies, specifically to the different computation of disclosure scores. Hummel and Schlick (2016), for instance, suggested that both theories are equally

valid, since voluntary disclosure theory explains a higher quality in the disclosure by superior performers and a higher quantity by inferior sustainability performers. However, almost all studies on this relation were focused on contexts of voluntary disclosure. The findings add to our understanding on the relation between performance and disclosure by analysing it in the context of mandatory disclosure.

This difference in context, together with the choice to focus on companies adopting the GRI framework, led us to hypothesize a positive relation. In fact, companies that would want to disclose wider, but generic, information to obtain a legitimizing effect, might not adopt the GRI framework, which requires a certain standard in terms of disclosure.

Furthermore, the mandatory nature of reporting might also affect the relation. Indeed, Directive 2014/95/EU does not prescribe strict reporting guidelines but requires companies to disclose on a specific array of topics. Therefore, we may consider a “wide and generic” disclosure to be the “standard” in the different context of my analysis, meaning something all companies are required to do by law. This, in turn, may effectively eliminate the legitimizing effect of disclosure. Therefore, the confirmation of the significant positive association may be explained through the lenses of voluntary disclosure theory as firms with better performances disclose more extensive to signal their superior performance.

The possible problem of endogeneity which may arise in this model is related to simultaneity, as one may argue that non-financial disclosure effectively affects the ESG Score. I solved this problem by using the scores for the previous year, while the non-financial disclosure score is related to the current year.

As in the previous regressions, size and profitability are found to be significantly associated with the level of non-financial disclosure; with size the relation is positive, as expected, while in the case of ROE again we find a negative relation, even if with just 90% confidence.

These findings add further strength to the results of the previous models on the relation between these variables and sustainability disclosure.

On the other hand, the level of investments, as measured by CAPEX, and the indebtedness (NETDEBT) turn out to be non-significant, confirming the results of model 3 (CAPEX was significant only in model 1).

The division by groups appears once again strongly significant, especially for Iberic countries, which perform significantly better than all others.

The pseudo R<sup>2</sup> of 17.13% is slightly higher than before, as the information criteria, so this model has a bit more explanatory power than the previous ones.

To see which out of the three pillars could be more related to the extent of the non-financial disclosure we could substitute ESGSCORE with the three scores ESCORE, SSCORE, GSCORE in the same model. It should be pointed out that ESG is like a “*three leg chair*”, if one pillar gets taken out the other two cannot stand anymore. This reasoning is just for checking which pillar could have the higher influence on the extent of non-financial disclosure.

I report on the *table 51* below the coefficients for the three variables and their significance (the other variables’ coefficients maintain the same significance and the same sign so for sake of simplicity they are not reported here).

	<i>Coefficient</i>	<i>p-value</i>
ESCORE	0.003952	0.253023
SSCORE	0.003533	0.028402**
GSCORE	0.005144	0.054574*

*Table 51: ESG scores disentangled*

SSCORE and GSCORE have positive coefficients which are significant at 5% and 10% level respectively, while ESCORE coefficient is not significant. We can say that the environmental pillar score is not related significantly with the extent of the disclosure, while the social and governance ones both have a significant relation with MNFD, apparently higher for the governance score and a bit lower for the social score.

### 5.3.3 Research question 4

As described in the formulation of the hypothesis, and given the variables defined, research question 4 takes the form of the following regression model:

$$\begin{aligned}
 tMNFD = & \beta_0 + \beta_1 BOARDSIZE + \beta_2 CEODUALITY + \beta_3 COMMITTEE + \beta_4 INCENTIVE \\
 & + \beta_5 GENDER + \beta_6 SPSKILLS + \beta_7 INDIPMEM + \beta_8 AVGTENURE + \beta_9 \log EMP \\
 & + \beta_{10} ROE + \beta_{11} NETDEBT + \beta_{12} CAPEX + \beta_{13} GERMANY + \beta_{14} IBERIA \\
 & + \beta_{15} NETHERLANDS + \varepsilon
 \end{aligned}$$

The goal of this model is therefore to establish whether there is a link between some selected corporate governance variables (chosen based on the literature review) and the level of material non-financial disclosure evaluated represented by MNFD. The results of the regression using the beta regression model are shown in *table 52*.

<i>Dependent variable tMNFD</i>	<i>Model 5</i>		
	<i>Coefficients</i>	<i>z-score</i>	<i>p-value</i>
const	-0.90504	-1.856	0.06348 *
BOARDSIZE	0.02929	1.551	0.12098
CEODUALITY	-0.30430	-2.303	0.02128 **
COMMITTEE	0.04034	0.240	0.80997
INCENTIVE	0.04114	0.326	0.74444
GENDER	0.00809	1.580	0.11405
SPSKILLS	0.00165	0.550	0.58232
INDEPMEM	0.00684	2.833	0.00462 ***
AVGTENURE	0.00510	0.234	0.81480
LogEMP	0.12008	3.279	0.00104 ***
ROE	-0.00543	-1.676	0.09367 *
NETDEBT	0.00112	0.389	0.69702
CAPEX	-0.03680	-2.239	0.02517 **
GERMANY	0.27659	1.599	0.10992
IBERIA	1.020064	4.461	8.17e-06 ***
NETHERLANDS	-0.619820	-2.705	0.00682 ***
Pseudo R <sup>2</sup>		0.1795	
Log-likelihood		188.2	
Akaike criterion		-342.44	
Bayesian criterion		-279.48	
Sample size		300	

*Table 52: Regression results for RQ4*

As we can see from the results CEODUALITY is significantly (at 5%) and negatively associated with the disclosure level, as expected: if the CEO is also chairman of the board there is a tendency to disclose a bit less in terms of sustainability.

Strong significance (p-value of 0.0046) is found for the percentage of independent members in the board, which is found to be positively related to the extent of non-financial disclosure. This is likely because independent members are less aligned to management and thus may request a higher level of transparency to the company.

Board size is found to be non-significant, contributing to the literature that finds the association between these variables not relevant (Cheng and Courtenay 2006). Surprisingly, non-significance is found also for the presence of the CSR committee and incentives for senior executives.

Gender, specific skills, and average tenure seem to be non-significant as well.

The control variables of size (logEMP) and profitability (ROE) are found again to be significantly associated with MNFD, the former positively and the latter negatively. This provides further evidence on the robustness of these findings.

Net debt is still non-significant, confirming the results of before.

CAPEX is found significantly (5%) and negatively related to the dependent variable, as in model 1. Given the mixed results (even if the sign is consistently negative), this variable could be analysed in further research.

I carried further robustness analysis employing different measures for control variables, as well as different models, to explore more in depth this issue and provide further strength to my findings. The results of these analysis are described in the Robustness analysis paragraph. The division by groups is found again to be significant, with Iberic countries significantly outperforming the base country (the constant is OTHERS) once again.

The adjusted R<sup>2</sup> of 17.95% is similar to the previous model, so the explanatory power is about the same, even if in this case the variables are much more (in fact the information criteria are lower than in the previous model).



## **6 Robustness analysis and conclusions**

This last chapter is dedicated to robustness analysis on the results of the regression models. It also includes limitations of the analysis, final conclusions and suggestions for further research.

### **6.1 Robustness Analysis**

This section is dedicated to the robustness analysis on the results of the models. The purpose is to provide further strength to my findings and check whether they are robust to the adoption of different measures for control variables and to the use of different estimation methods.

To firstly check if the relations found in all the small models could be robust we could put all the variables from previous models into one big model and see if the significance and signs remain. *Table 53* shows the results.

<i>Dependent variable tMNFD</i>		<i>Model 6</i>	
	<i>Coefficients</i>	<i>z-score</i>	<i>p-value</i>
const	-1.75469	-3.054	0.00226 ***
GC	-0.03109	-0.210	0.83367
SDG	0.36842	1.886	0.05933 *
LARGESTINV	-0.00571	-1.827	0.06763 *
ISGOV	-0.07757	-0.620	0.53549
ESGSCORE	0.01006	1.912	0.05587 *
CONTRSCORE	0.00748	3.228	0.00125 ***
BOARDSIZE	0.03784	1.955	0.05055 *
CEODUALITY	-0.30275	-2.316	0.02053 **
COMMITTEE	-0.053821	-0.321	0.74834
INCENTIVE	-0.0160	-0.127	0.89867
GENDER	0.00604	1.333	0.25704
SPSKILLS	0.00165	0.535	0.59244
INDEPMEM	0.00540	2.100	0.03577 **
AVGTENURE	-0.00776	-0.357	0.72100
LogEMP	0.11078	2.783	0.00538 ***
ROE	-0.00505	-1.571	0.11607
NETDEBT	0.00184	0.655	0.51263
CAPEX	-0.03349	-2.064	0.03899 **
GERMANY	0.21324	1.207	0.22751
IBERIA	1.02189	4.405	1.06e-05 ***
NETHERLANDS	-0.67326	-2.932	0.00337 ***
Pseudo R <sup>2</sup>		0.2272	
Log-likelihood		197.7	
Akaike criterion		-349.45	
Bayesian criterion		-264.41	
Sample size		298	

*Table 53: Regression results for the general model*

We can see that all the variables of interest that were significant in the previous models maintain both significance and sign also in this case (model 6), with the only exception of ROE which is now non-significant. Board size on the other hand shows now a 10% significance, and the sign is positive: this suggests that some positive relation between board size and extent of non-financial disclosure might exist.

Now we can perform a robustness analysis referring to model 6, changing some control variables and estimation method. I follow these alternatives:

- Model 7: beta regression using the natural logarithm of 2018 Revenues (logREV) instead of full-time employees (logEMP) as a measure of size.
- Model 8: beta regression using 2018 ROA (Return on assets) as a measure of profitability instead of ROE.
- Model 9: beta regression using both logREV instead of logEMP as a measure of size and ROA instead of ROE as a measure of profitability.
- Model 10: beta regression using 2018 Tobin's Q (TOBINSQ) (indicator on market performance) as a measure of performance instead of ROE.
- Model 11: beta regression using both logREV instead of logEMP as a measure of size and TOBINSQ instead of ROE as a measure of performance.
- Model 12: OLS (ordinary least squares) instead of the beta regression on the non-financial disclosure score MNFD (instead of transformed tMNFD used until now) on the same variables used in the main model.

All the other variables, unless specified above, are kept the same as in the main model.

The following *table 54* shows the results for each of the six alternative models.

	<b>Mod. 6 (Original)</b>	<b>Mod. 7</b>	<b>Mod. 8</b>	<b>Mod. 9</b>	<b>Mod. 10</b>	<b>Mod. 11</b>	<b>Mod. 12</b>
const	Neg ***	Neg **	Neg ***	Neg **	Neg **	Neg **	Pos ***
GC	N/S	N/S	N/S	N/S	N/S	N/S	N/S
SDG	Pos *	Pos *	Pos *	Pos *	Pos *	Pos *	Pos **
LARGESTINV	Neg *	Neg *	Neg *	Neg *	Neg *	Neg *	Neg *
ISGOV	N/S	N/S	N/S	N/S	N/S	N/S	N/S
ESGSCORE	Pos *	Pos **	Pos **	Pos **	Pos **	Pos **	Pos *
CONTRSCORE	Pos ***	Pos ***	Pos ***	Pos ***	Pos ***	Pos ***	Pos **
BOARDSIZE	Pos *	Pos **	Pos **	Pos **	Pos **	Pos ***	N/S
CEODUALITY	Neg **	Neg **	Neg **	Neg **	Neg **	Neg **	Neg ***
COMMITTEE	N/S	N/S	N/S	N/S	N/S	N/S	N/S
INCENTIVE	N/S	N/S	N/S	N/S	N/S	N/S	N/S
GENDER	N/S	N/S	N/S	N/S	N/S	N/S	N/S
SPSKILLS	N/S	N/S	N/S	N/S	N/S	N/S	N/S
INDEPMEM	Pos **	Pos *	Pos **	Pos **	Pos **	Pos **	Pos *
AVGTENURE	N/S	N/S	N/S	N/S	N/S	N/S	N/S
LogEMP	Pos ***	-	Pos **	-	Pos***	-	N/S
ROE	N/S	N/S	-	-	-	-	N/S
NETDEBT	N/S	N/S	N/S	N/S	N/S	N/S	N/S
CAPEX	Neg **	Neg *	Neg *	N/S	Neg*	Neg*	Neg **
GERMANY	N/S	N/S	N/S	N/S	N/S	N/S	Pos **
IBERIA	Pos ***	Pos ***	Pos ***	Pos ***	Pos***	Pos***	Pos ***
NETHERLANDS	Neg ***	Neg ***	Neg ***	Neg ***	Neg***	Neg***	Neg ***
logREV	-	N/S	-	N/S	-	N/S	-
ROA	-	-	N/S	N/S	-	-	-
TOBINSQ	-	-	-	-	N/S	N/S	-
Pseudo R <sup>2</sup>	0.2272	0.2173	0.2213	0.2133	0.2195	0.2117	0.2124
Log-likelihood	197.7	194.6	197.9	195.3	197.8	195.3	115.2
Akaike	-349.45	-343.19	-349.77	-344.67	-349.66	-344.53	-186.38
Bayesian	-264.41	-258.15	-264.50	-259.40	-264.40	-259.27	-105.05
Sample size	298	298	301	301	301	301	298

Table 54: Results of alternative models used for robustness analysis

SDG and LARGESTINV are very robust to the use of different variables and different regression models. The two variables maintain their sign and significance in all models. This provides further strength to the results of the positive association between adherence to SDGs and the extent of the non-financial disclosure and of the negative association between ownership concentration and non-financial disclosure.

On the other hand, GC and the presence of government agencies in the capital do not appear to be strong determinants of the extent of sustainability disclosure.

The positive association of ESG performance (ESGSCORE and CONTRSCORE) and non-financial disclosure are confirmed by all six alternative models.

CEODUALITY is confirmed to have a negative and significant influence, as expected from theoretical expectations and most prior literature.

Now that it is considered together with all other variables, BOARDSIZE is found to be positively significant in all models except one: we can say that as board size increases the companies tend to disclose more non-financial information.

The findings about control variables appear to be robust to different models, although size loses significance when measured through revenues instead of employees.

Profitability is not found significant neither when measured with ROE, with ROA, or with Tobin's Q. Same goes for NETDEBT, found non-significant in all cases.

The finding of a significant and negative association of CAPEX and non-financial disclosure is found to be robust, retaining significance in all models except one. This supports legitimacy theory, as companies with older assets are likely to have worse environmental performances and, as a consequence, can tend to disclose more to obtain a legitimizing effect

Finally, the findings about the superior performance of Iberic countries and of inferior performance of Dutch companies are very robust.

The explanatory power, measured by the pseudo  $R^2$  in the cases of beta regression and by  $R^2$  in the case of OLS, is pretty much the same for all models.

Akaike and Bayesian information criteria show that the beta regressions are better models, with a slight edge for those where size is measured by employees.

Overall, the findings of my models appear quite robust to the use of different metrics and different models, giving strength to my findings. In particular, the percentage of independent members in the board of directors, the fact that the chairman of the board is (or has been)

also the CEO, the ESG score, and the ESG controversies score are found to be strongly significant and robust determinants of material non-financial disclosure.

Adherence to SDGs, the size of the board of directors, the percentage of stocks owned by the largest investor, and the capital expenditure also appear to be important determinants, but slightly less than the others.

The size of the company is showing strong significance when measured through the number of employees, but becomes non-significant when measured with the revenues, so further research could try to assess this topic.

Iberic companies are found the only countries to consistently perform better than the others in terms of the extent of ESG reporting.

On the other hand, Dutch companies perform consistently worse than the base country regarding the extent of non-financial disclosure.

## **6.2 Conclusions, limitations and future research**

This research aims at studying the state of the art of sustainability reporting in Europe in 2018, the second year since entry into force of the directive 2014/95/EU and its national transpositions, which require all large public interest entities to disclose certain non-financial information on ESG matters.

Since the new regulatory framework does not prescribe specific indicators or frameworks but only wide areas that should be reported upon, the goal is to explore the differences in disclosure between companies as a response to the new regulation.

I started by collecting data for the 599 European companies which compose the STOXX Europe 600 and analysed qualitatively and quantitatively these data.

Then, focusing on companies following the GRI guidelines, I used a material non-financial disclosure score that considers the differences among sectors in material indicators. Using this score, I tried to evaluate the determinants behind the extents of non-financial disclosure.

Most prior literature has focused on contexts of voluntary reporting considering sometimes narrower aspects of sustainability, often environmental disclosures. Both theoretical expectations and empirical evidence on the determinants and effects of sustainability disclosure are often mixed and/or inconclusive.

My work adds to current knowledge by studying sustainability reporting in a mandatory context and focusing on all aspects of sustainability disclosure, coherently with the broad nature of the European directive and the GRI framework. It may also provide useful insights for future regulation developments and implementation of mandatory requirements. Through various non-parametric univariate analyses, I find that companies in different sectors disclose different indicators and to different extent. This is consistent with previous literature suggestions (Gamerschlag, 2011), and provides strength to the choice of including the variations in the material non-financial score.

The key findings from the regression models are as follows.

First, I find that adhering to the SDGs is a significant positive determinant of the extent of information disclosed, while being a signatory of the UN GC is not a statistically significant factor.

Second, the ownership concentration is found to have a negative significant relation with the extent of the non-financial disclosure, as expected from the literature, while no statistical significance for the relation between public entities ownership and disclosure is found.

Third, I find evidence in favour of voluntary disclosure theory (Verrecchia, 1983; Dye, 1985), as companies with higher sustainability performance tend to disclose more. This is particularly interesting as in the literature there is not a consistent and unambiguous relation between these variables.

Fourth, the size of the board of directors and the extent of non-financial disclosure turned out to be significantly and positively related, as found in most literature. On the other hand, the fact that the chairman of the board is or has been CEO of the company limits the extent of non-financial information disclosed, and the significance is stronger than in case of the board size. This is in line with the expectation. The existence of a CSR committee in the board and of incentives for CSR performance at executive levels is proven to be non-significant, against my expectations. Diversities of gender and of competencies in the board are found non-significant as well. Here the literacy was divided, so this result is not surprising. The board independence is found to be a significant and positive determinant of the level of disclosure, as expected, while the average time each board member has been on the board is non-significant variable.

Furthermore, the size of the company is proven to be significant and positive, but only when measured with the number of employees, not when measured with revenues. The level of

indebtedness is not found to be a significant determinant, same as profitability, measured by ROE or ROA. Capital expenditure is an aspect on which the literature found mixed results. Here it shows signs of a slightly negative relation with the extent of non-financial disclosure, supporting legitimacy theory.

Among the 17 countries in the sample, Spain proved to be the one whose companies disclose significantly more non-financial information than the others, while the companies from the Netherlands' significantly less. Among the other countries (represented by a large enough sample) strong statistical differences cannot be found.

These findings expand extant knowledge on the relations between these variables and the extend of non-financial disclosure.

Although the robustness analysis provides strength to my results, there are still some limitations that may impact the outcomes of the research.

The first and most relevant aspect is represented by the way the non-financial disclosure is measured (MNFD), which is focused on measuring the company's disclosure of sectors material issues. In the literature different indicators are used to evaluate the extent of disclosure: therefore, if different measures are adopted, it is possible that results of the research are affected by the choice of the measure; computing MNFD in a different way might have led to slightly different results. Given that prior research has highlighted the potential impact of different disclosure scores on results (Urquiza et al., 2009), future studies may want to consider analysing different aspects of disclosure, for instance focusing on how quantitative (or less generic) disclosures are, to provide further understanding of the state of sustainability disclosure and of the effects of the regulation.

Another limitation is posed by the ESG performance score. I used the Thomson Reuters Eikon score, but among different datasets the scores can change significantly (Diebecker et al., 2019) and alter the results of the finding.

Further research therefore could try to assess the same problem with many different ESG scores found in different databases.

Another interesting topic concerns the association between non-financial disclosure extent and the presence of the CSR committee on the board and of CSR incentives for executives, which surprisingly were found non-significant and therefore could be area of future research. The relation between non-financial disclosure and profitability, not found significant in this research could be further analysed, as well as for indebtedness.



The influence of the government can be analysed in greater detail, maybe considering the level of its ownership in the companies rather than just if it is present or not.

Furthermore, the relation between ESG performance and disclosure has clearly very important regulatory implications and research may want to analyse it further, given that prior literature has found mixed evidence.

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