



Climate change, ESG criteria and recent regulation: challenges and opportunities

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Abstract

The application of environmental, social and governance (ESG) criteria has now become a more than essential requirement in the financial world. Therefore, it is necessary to understand, select and assess the risks of these ESG criteria and evaluate how they can impact a product or investment decision. Thus, the main objective of this article is to analyze ESG (Environmental, Social and Governance) indicators and their potential impacts in the framework of non-financial information. Current regulatory developments, such as the European Corporate Sustainability Reporting Directive (CSRD), are pushing to make ESG indicators (within this triple perspective: social, environmental and governance risks) a key set of information to be used for reporters and users of information. This article will study in further detail the main implications these regulations will have in how corporations will reflect social and ecological footprint information in their external reporting. Since these ESG indicators could have relevant financial impacts on the financial drivers of a corporation, stakeholders will be concerned on how enterprises are dealing with these ESG risks. Therefore, this ESG data will increase transparency and would mean a better understanding on how companies and investors have a sustainability compromise to evolve to a neutral carbon economy. In order to understand a company's commitment with these ESG criteria, stakeholders would have to assess different aspects of the information reported. In this sense, this article will focus on how credit rating agencies incorporate these risks in their assessments. Credit rating agencies are becoming important actors in the sustainability criteria, as they incorporate ESG risks in their assessments, transmitting the importance of these indicators to investors and to markets. This study will look into the different time horizons between financial profitability and sustainability indicators. Current tendency and huge demand of non-financial indicators do not have the same profundness, framework and tradition as financial indicators. This could lead to a situation in which it would be necessary a period to adapt both worlds and make them join and connect together in a sense in which one need the other one.

Extended author information available on the last page of the article

Keywords Climate change · Environmental sustainability · ESG indicators · Non-financial information · Corporate governance · European Union

JEL Classification G3 Corporate finance and governance · M14 Corporate culture, diversity, social responsibility · G38 Government policy and regulation

Abbreviations

ESG	Environmental, social, and governance
ECAI	External credit assessment institutions
UNE	United Nations
CSR	Corporate social responsibility
CNMV	Comisión Nacional del Mercado de Valores
CG	Code of governance/
GREY	Global reporting initiative
SASB	Sustainability accounting standard
TFCFRD	Task force on climate-related financial disclosures
CDP	Carbon disclosure project
E	Earnings
BV	Book value
R	Revenue
CF	Cash flow
D	Dividend
W	Weighted average
ROE	Return on equity
NFRD	Non-financial reporting directive
CSRD	Corporate sustainability reporting directive

1 Introduction

The objective of this article is to analyze the main ESG (Environmental, Social and Governance) indicators within the framework of the sustainability strategy of the economic and financial systems of the different countries that are part of the European Union (EU). This sustainability strategy in the EU has been significantly promoted by the European Green Deal for the European Union (EU), (2019). European Green Deal) and its associated Finance Action Plan. In practice, it means moving towards sustainability and inclusiveness with important commitments for economic systems and for EU companies. In the image (Fig. 1). It is displayed that this agreement is a component of the European growth strategy, which seeks to reshape the EU into an equitable and prosperous society. This vision includes fostering a contemporary, resource-efficient, and competitive economy, striving to achieve net-zero greenhouse gas emissions by 2050, and “temporarily” decoupling economic growth from the timeless of resources utilizations and their primary components. The figure illustrates the different elements of the Green Deal.

Fig. 1 The European green deal elements. Source: Prepared by author from European Commission (2020) and European Union (EU) (2019)



The current ESG reports that are being published reflect the company's triple activity in environmental protection and climate change, as well as social and corporate governance actions. These publications have been developed for the application of the Non-Financial Reporting Directive (NFRD),¹ which has been mandatory since 2017 for large, listed companies (with more than 500 employees), as well as for insurance companies and banks regardless of their size and orientation to the capital market.

In this context, the new Corporate Sustainability Reporting Directive (CSRD) will mean the progressive replacement of the Non-Financial Reporting Directive (NFRD) in force until now. In practice, for all companies, regardless of the listing requirement and the number of employees, the new directive (CSRD) imposes the obligation to present non-financial information specified in ESG indicators. These indicators will reflect information on the social and ecological footprint of companies specified in sustainability actions in different areas: from environmental protection and actions on climate or climate change, to other actions related to social aspects and corporate governance, including actions in relation to their workers.²

In this way, in the first sections we will delve into the concepts such as climate change and the business risk associated with it; as well as familiarize about the

¹ Non Financial Reporting Directive. European Parliament and Council. (2014). Non-Financial Reporting Directive (DIRECTIVE 2014/95/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 22 October 2014 amending Directive 2013/34/EU as regards disclosure of non-financial and diversity information by certain large undertakings and groups. [URL: (europa.eu)].

² Corporate Sustainability Reporting Directive. European Parliament and Council. (2022). Corporate Sustainability Reporting Directive (DIRECTIVE (EU) 2022/2464 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 14 December 2022 amending Regulation (EU) No 537/2014, Directive 2004/109/EC, Directive 2006/43/EC and Directive 2013/34/EU as regards sustainability reporting by companies (Text with EEA relevance).

knowledge of the subject, to continue in the third section to develop the typology of ESG criteria and the risks they entail, highlighting its importance and impact on investment decisions.

The fourth section has tried to demonstrate the importance of these criteria and reflect how they have been related to investment decisions. To move on next (fifth section) to delve into the European and Spanish regulatory developments that is mandatory for companies to report these ESG indicators in Non-Financial Information reports, as well as what the future are to modify the regulations and where the principles of the same are directed.

Related with the significant impact of ESG indicators has on investment decisions, the sixth part presents ESG indicators from the perspective of credit rating agencies. These agencies are part of the most relevant actors, which have historically been working on these indicators and currently manage many historical series of them. Our objective is to analyze what they have been publishing to the different actors, how the indicators are and what purpose they have.

Our intention is to highlight the value of the information they reveal and to the contribution of value to society, in its performance and its shareholders, as well as compare with what the new legislation will require from companies.

Finally, the seventh section presents the main conclusions, prospects and the main challenges and implications for the main market players. We aim to provide conclusions by leveraging the pre-existing information and examined data from preceding sections and chapters. Our focus will be to identify the most crucial information and discern the trends predominantly embraced by market participants. We also intend to proactively anticipate the latest developments and shifts in the regulatory landscape, particularly in relation to the objective of "maximizing returns for shareholders while ensuring the sustainable and efficient allocation of resources."

2 Climate change, ESG and business risk

Throughout global history, the Earth has naturally warmed and cooled, so we could say that changes in climate have always existed. The greenhouse effect is a natural process that allows the Earth to maintain the conditions necessary to support life: the atmosphere retains part of the Sun's heat; without the greenhouse effect, the Earth's average temperature would be below freezing point. (IPCC, 2023: Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, H. Lee and J. Romero (eds.)]. IPCC, Geneva, Switzerland, pp. 35–115, <https://doi.org/10.59327/IPCC/AR6-9789291691647>). The atmosphere is composed of various gases that, in the right proportion, fulfill their mission, which are to guarantee the conditions for life on Earth (Philander, 2008; Schuldt, et al., 2011). Thus, in the past the cycles of climate change were much slower. However, at present they are accelerating, and these alterations are produced mainly by the men's action. This human activity increases the emission of greenhouse gases into the atmosphere, and it retains more heat than necessary, causing the average temperature of the planet to increase and produce what we popularly call global warming (Aizebeokhai, 2009).

The conversation centers on the impact of gases produced by the swift buildup of CO₂ and their consequences, including the manifestation of risks and potential crises in underappreciated assets.

Different studies carried out by the Intergovernmental Panel on Climate Change (2007) show that global greenhouse gas emissions from human activities have increased since the pre-industrial era, by 70% between 1970 and³ 2004. Annual carbon dioxide (CO₂) emissions increased by around 80% between 1970 and 2004. This action of the human being supposes in many cases an irresponsible use of the resources of the planet. Thus, according to the United Nations Framework Convention on Climate Change (1992), and the (UFCC, 2015), global climate change “is a change in climate due directly or indirectly to human activity that alters the composition of the global atmosphere and that goes beyond natural climate variability.”⁴

Man-made pollution from emissions released into the atmosphere generates greenhouse gases (GHGs), which are those that function like the glass of a greenhouse, that is, they retain heat and prevent it from escaping producing a warming of the atmosphere (⁵Maucieri et al., 2017). Many of these gases occur naturally, but due to human activity, the concentration of some of them is increasing, especially those of carbon dioxide (CO₂), methane, nitrous oxide and fluorinated gases (Philander, 2008)). These greater emissions in the Earth’s atmosphere generate greater heat in the lower layers of the same and originates the well-known global warming. Global warming is the cause of climate change, that is, the increase in global temperatures caused by emissions of greenhouse gases into the atmosphere derived from human action, which are causing alterations in the climate that would not occur naturally (Montzka et al., 2011). Some of the main causes of climate change and increased emissions are (IPCC, 2007):

- Deforestation: thanks to photosynthesis, trees absorb CO₂ and return it to the atmosphere in the form of acting oxygen, as well as natural climate regulators. The uncontrolled clearing of rainforests is jeopardizing this beneficial effect.
- Fossil fuel combustion: the combustion of coal, oil and gas produces carbon dioxide and nitrous oxide.
- Nitrogen fertilizers: these types of fertilizers are increasingly used in agriculture and produce large amounts of nitrous oxide.
- Livestock development: livestock is one of the main sources of methane emissions. In fact, the United Nations recommends reducing our meat consumption as one of the main recipes to fight climate change.
- Destruction of marine ecosystems: the oceans are also sinks for CO₂ generated. In addition to their destruction, the problem is when they reach their

³ https://archive.ipcc.ch/home_languages_main_spanish.shtml.

⁴ <https://unfccc.int/es/process-and-meetings/que-es-la-convencion-marco-de-las-naciones-unidas-sobre-el-cambio-climatico>.

⁵ Carbon dioxide (CO₂), Methane (CH₄), Halogenated compounds, Tropospheric ozone, Nitrogen oxide. Pmainly caused by the burning of fossil fuels for electricity generation, transport, heating, industry and building. Also caused by livestock, agriculture (mainly rice cultivation), wastewater treatment and landfills among others.

limit, the oceans acidify and there is a higher mortality rate of marine flora and fauna.

- Population increases: the world's population continues to grow and consume. A growing population increasingly demands more resources, which generates an increase in the emission of greenhouse gases.

This global increase in temperature brings disastrous consequences that endanger the survival of the Earth's flora and fauna, including humans. The impacts of climate change include the melting of ice mass at the poles, which in turn causes sea level rise, causing flooding and threatening coastal coastlines (even small island states are at risk of disappearing). Climate change also increases the occurrence of more violent weather events, droughts, fires, the death of animal and plant species, the overflow of rivers and lakes, the emergence of climate refugees, and the destruction of livelihoods and economic resources, especially in developing countries (Ford et al., 2011).

From the point of view of market producing actors or companies, climate change has physical risks, which arise from the physical process of climate change itself. They can be divided into critical physical risks (for example, unexpected climatic events), which directly impact the productivity of agents or indirectly affect other parties by a disruption of supply chains, or chronic physical risks (for example, significant reduction in rainfall in a given area) that, in addition, can cause the need for adaptation or longitudinal migration of economic activity (Diaz & Moore, 2017).

In addition, climate change poses transition risks, which describe the risks of adjustments to a low-emission economy. These risk can also be transmitted to financial risks through public policies that could induce a transformation of production and consumption (Benedetti et al., 2021). The route and speed of these policies vary, posing risks by possibly of gratifying certain sectors at the sacrifice of others. Other transmission channels are advances in technology and its use for transformations or a change in demand preferences and disruption processes that could lead to so-called stranded assets or underdemanded assets (Semieniuk et al., 2021).

However, economic, and financial transitions could also generate transition opportunities in view of the European Commission (EC) recommendations on transition policies towards a greener economy (EU, 2019). In general, physical and transition risks are interrelated (especially long-term), for example through policies that expose economic agents to short-term transition risks while reducing exposure to future physical events (or vice versa) (The European green deal elements 2020).

The application of environmental, social, and corporate governance standards, commonly referred to as ESG (Environmental, Social, Governance), has evolved into an absolute necessity within the financial realm. Consequently, evaluating the risks associated with these ESG criteria and their potential influence on product or investment decisions is imperative or how can we affect to the others. Therefore, "ESG Risk" pertains to the risk associated with factors connected to environmental, social, and governance issues. In this context, the assessment of these ESG criteria's risks and their potential impact on product or investment decisions is crucial (Boffo and Patalano 2020).

In this context, it is necessary to assess the risk of these ESG criteria and how they can impact a product or investment decision:

- Environmental risks are those that relate the activity of the company and its impact, both direct and indirect, with the environment and they are currently being recognized as a component of climate change risk (Kedward et al., 2022). All business activity has environmental impacts. With greater or lesser economic impact, what is certain is that compliance with these environmental criteria is increasingly valued as efficiency, transparency, quality, and commitment of the company (Gupta et al., 2016).
- Social risks are those that are based on the relationship of the company with society with special care with those with whom they have a more direct relationship: employees, shareholders, customers, suppliers, or those local communities where they generate their activity (Aula, 2010). These risks may include potential lawsuits, fines, or penalties due to issues with employees, shareholders, communities, government, etc., which would mean a significant impact on financial drivers of corporations that should be identified and considered by investors.

Governance risks include both the way in which the company is managed and compliance with rules and regulations, external or specific to the company. Until recently, emphasis on corporate governance as a form of protecting the interests of shareholders was emphasized (La Porta et al., 2000). This approach has shifted to a broader concept. The central role of shareholders is not abandoned, but the concept of all those who are affected in one way or another by business decisions, their main “stakeholders or interest groups”, is also added.⁶(Almagtome et al., 2020). Some potential conflicts of interest among top executives could arise considering governance risks. Hence, continuous research is being conducted to reevaluate compensation policies for senior executives. These policies should shift their primary focus away from short-term financial performance goals for shareholders and incorporate ESG considerations and the long-term objectives of other stakeholders.

3 Typology of ESG criteria

In today’s rapidly evolving business landscape, ESG criteria have gained significant prominence. These criteria serve as a compass, guiding organizations toward responsible and sustainable practices that extend far beyond financial considerations. Within the realm of ESG, there exists a complex and dynamic interplay between risk and opportunity, where financial implications are intricately entwined. This explores the multifaceted relationship between risk, opportunities, and the financial impact (see Fig. 2) within the context of ESG criteria, shedding light on how these factors influence decision-making processes and shape the future of businesses and investments. As we delve deeper into this topic, we will uncover the pivotal role that ESG

⁶ They are the key actors that are affected by the decisions of a company (workers, social organizations, shareholders and, customers, suppliers, among many).

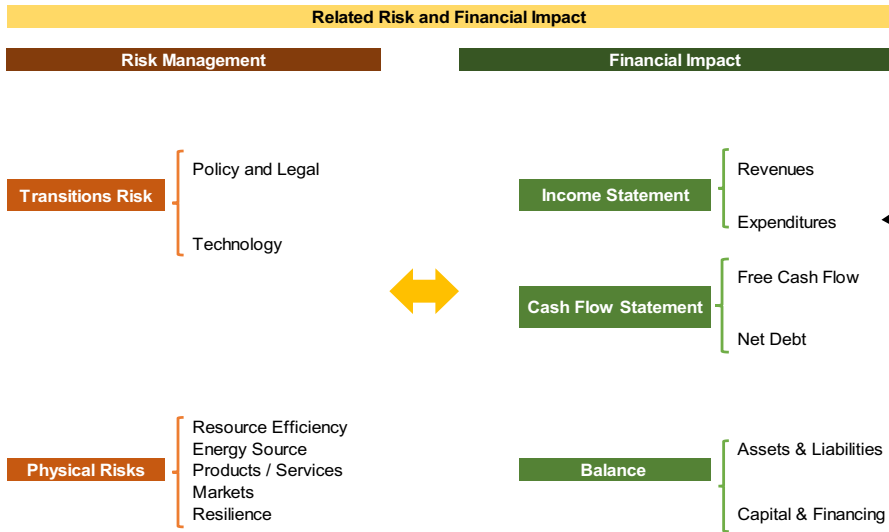


Fig. 2 Climate related risk and financial impact. Source: Own preparation from the Working Group on Climate-related Financial Disclosures, Final Report

plays in fostering responsible, resilient, and prosperous enterprises while navigating the intricate terrain of global challenges and opportunities.

Taskforce on Nature-related Financial Disclosures (2023). Final TNFD Recommendations on nature related issues published and corporates and financial institutions begin adopting., tnfd.global.

3.1 Environmental criteria

An environmental risk is any circumstance or factor that leads to the possibility of damage to the environment. Environmental risk is the possibility that damage to the environment occurs naturally or by human action. However, risk is defined as an effect of uncertainty, so it implies both negative and positive potential effects, i.e., threats and opportunities.

The commitment to reduce greenhouse gas emissions achieved in Paris in 2015 and extreme atmospheric events have made the risks associated with global warming climb considerably in terms of probability and impact on the risk map prepared every year by the World Economic Forum (UNFCC, 2015; WEF, 2022).^{7, 8}

Increasing regulations (2030 Agenda, Paris Treaty) because of reduction commitments and interest on climate impacts on company balance sheets by different stakeholders are leading more and more companies to report on them in their official reports to the market. But there is still some way to go. This information, the quality

⁷ Report of the Conference of the Parties on its twenty-first session, held in Paris from 30 November to 13 December 2015 FCCC/CP/2015/10/Add.1 (Agenda 2030, Paris Treaty).

⁸ Global Risks Report 2022 | World Economic Forum (2022) <https://www.weforum.org>.

of it and the detail of the data reported is one of the great drawbacks to be able to evaluate the environmental risk.

As environmental risks we can find the following.

3.1.1 Physical risks

These risks come because of climate change that can lead to changes in weather patterns, which can have implications on a company's financial statements, such as a direct impact on its assets or indirect impacts on its distribution chain, for example. In this way, these physical risks can be acute that substantially affect the operations or assets of a company, such as earthquakes, hurricanes, floods, cyclones, or adverse effects on weather. There are also chronic risks, which are those that refer to long-term changes in weather patterns.

These physical risks (such as flooding) can lead to a delay in the construction of a project, which leads to a delay in the commissioning of the project and, therefore, a delay in obtaining operating cash flows. Therefore, these physical risks are of the company itself, that is, of the potential impacts that physical environmental risks may have on its assets and / or operations and therefore on its credit quality.

3.1.2 Transition risks

Transition risks are those that arise when an economy has a transition effect towards changes in its environmental impact. An example is the costs of transition to an economy with low impact on CO₂ emissions. These transition risks may involve changes in policy, legal, technological and market changes. These changes entail adaptations to the requirements of the changes. Depending on the nature, speed or importance given to this transition, the risks may be higher or lower due to the shorter, medium, or long-term impact they may have on companies. These transition risks are risks of the economic sector in which the company is operating. Once they materialize, they can impact the company's specific financial ratios and therefore can have influence in the company's cash flows.

3.1.3 Geopolitical, regulatory and legal risks

Geopolitical risk becomes important in an environment of increasing volatility in international politics and contagion effect due to the globalization. Geopolitics, in all its derivations, must be understood as another strategic challenge and be integrated into periodic risk assessments. These geopolitical risks can have influence in the regulations, rules, and laws that different countries carry out, so they are directly related to the regulatory and legal risks in relation to environmental risks. Thus, regulatory risks in relation to climate change are continuing evolving. Changes are usually actions to limit activities that contribute to climate change and actions that promote and boost adaptation to climate change. These geopolitical, regulatory, and legal risks are risks of the economic sector in which the company is operating. Once they are finalized, they can affect the specific financial ratios of the company, its results, cash flows, as well as the credit rating of a company.

3.1.4 Technological risks

Technological modifications or innovations that support the transition to a low-emission or energy-efficient economy can have an impact on organizations. The development and use of emerging technologies such as renewable energy, energy efficiency, carbon capture and storage can also affect the competitiveness of companies. Your production levels, what is produced and the supply costs of products, as well as the demand for your products and services may also be affected. In this way, new technologies come to take the place of old systems and involve disruptive changes in the economic system, having companies that adapt and are leaders and others that do not know how to adapt and lose competitive advantages. These technological risks are risks of the economic sector in which the company is operating.

3.1.5 Market risk

Market risk is the risk that the value of an asset will reduce the value due to fluctuations in market conditions. This risk can be influenced by the different variations in demand and supply for certain products or services that environmental criteria may need for a given sector. These market risks are risks of the economic sector in which the company is operating. Once they materialize, they can affect the specific financial ratios of the company and therefore in its cash flows and have an economic-financial impact.

The relationship with transition risk to a low-carbon economy, particularly regarding market risk, has emerged as a critical facet of the modern financial landscape. As the world endeavours to address the pressing concerns of climate change and shift toward a more sustainable future, market dynamics are undergoing a profound transformation. The market risk associated with this transition revolves around the potential financial impacts stemming from shifts in consumer preferences, technological advancements, and evolving regulatory frameworks aimed at reducing carbon emissions. Companies and investors must navigate these market risks as they transition to a low-carbon economy, which can entail both opportunities and challenges. Adapting to changing consumer demands, embracing clean technologies, and aligning business models with sustainability goals are becoming imperatives for mitigating market risk while capitalizing on the opportunities presented by a decarbonized world. In this context, understanding the relationship between transition risk, particularly in the market domain, is pivotal for informed decision-making and successful long-term financial performance.

3.1.6 Reputational risk

Reputational risk is the risk that negative public opinion will avoid or decrease demand for the products of a specific sector. The impact of a risk like the one mentioned depends on the business trip, the sales cycle, competitiveness in the market and the fluidity of customers, among other factors. These reputational risks are risks of the company itself. Once they are finalized, they can affect the specific financial ratios of the company and therefore the automatic requirement of the statistical

model that can be defined in the assessment, as well as the economic-financial profile of the expert models. An example could be the “Volkswagen” scandal for the manipulation of the emissions of its diesel engines or companies that have made discharges in areas of special ecological value.

3.2 Social criteria

These social criteria treat the relationship of the company with society with special care with those with whom they have a more direct relationship: employees, shareholders, customers, suppliers, or those local communities where it generates its activity. The aspects are very wide and varied, as well as the groups to which it is focused.

These social criteria are, for example, whether non-financial corporations comply with human rights, their impact on the community or society, as well as on their stakeholders, the social responsibility of their products, health and safety in their processes, respect for diversity and relationship with their consumers, among others. These social criteria are risks of the company itself. Once they materialize, they can affect the company’s specific financial ratios and therefore have potential impacts in reference to this social risk can come from:

1. Competitive benefits (or not) of companies in relation to these social criteria.
2. If a company follows these social criteria, it is because its management is adequate and performs its actions correctly according to these social criteria.
3. Once the risks materialize, they can affect the company’s specific financial ratios and therefore its cash flows versus financial solvency.

3.3 Governance criteria

Corporate governance focuses on the impact of stakeholders, as it specifically links companies to shareholders and company management, while addressing board structure, executive compensation, and shareholder rights. Corporate governance is framed in the principles of transparency, governance, and control in business management. However, governance exceeds these limits and adds that this government also affects in one way or another business decisions, and its main stakeholders.

Listed companies are subject to the “Código de Buen Gobierno” (in Code of Governance of listed companies (hereinafter CGGLC) which was published on February 24, 2015 after being approved by Resolution of the Board of the CNMV⁹ on February 18, 2015. (CNMV, 2014). This code replaces the 2006 Conthe Code updated in June 2013 and the companies to which it is addressed must take it into account when drafting their Annual Corporate Governance Report from 2015 (which will be sent to the Spanish Stock Exchange Commission–CNMV—in 2016). (Spain, 2006). Those companies are therefore subject to it. The CGGLC contains a total of 64 recommendations, including some of those contained in the Conthe Code and a

⁹ CNMV: Comisión Nacional del Mercado de Valores (Spanish Stock Exchange Commission).

total of 23 out of 38 new recommendations. We should refer to recommendations 54th and 55th which suggest the following:

1. That there is a CSR (Corporate Social Responsibility) policy that includes the principles or commitments that the company voluntarily assumes with the different stakeholders, and that it identifies, at least, the objectives of that policy, the corporate strategy in terms of sustainability, environment and social issues and the mechanisms for monitoring non-financial risk, ethics and business conduct, among others.
2. That the company report, in a separate document or in the management report, matters related to corporate social responsibility, using one of the internationally accepted methodologies.
3. These governance criteria are company risks that, once they are realized, can have an impact on the company's specific financial ratios and therefore its credit quality.

3.4 Importance of ESG criteria

The consideration of ESG issues is not a new phenomenon. Many investors have long considered these indicators in fundamental investment analysis by including a reputational risk assessment, regulatory developments, or megatrends such as aging populations.

In the realm of ESG analysis, there has been a notable evolution as analytical frameworks become increasingly integrated. These frameworks have become instrumental tools for evaluating a company's performance in the context of sustainability and ethical considerations. ESG analysis has transcended its early stages of mere checklists and is now incorporating sophisticated metrics, data analytics, and advanced methodologies. This evolution reflects a growing recognition that ESG considerations are integral to prudent investment decisions and responsible corporate management.

Modern references to ESG analysis, however, refer to a systematic consideration of relevant and material ESG issues rather than the superficial inclusion of one or more of them. On the other hand, consideration of ESG issues is a complement (not a substitute) for traditional fundamental analysis.

As noted above, ESG issues remain relevant throughout the investment process, from initial analysis to buying, selling, or holding a particular financial asset. Due to the existence of large investment actors (large corporations, collective investment institutions, for example), and a greater awareness of ESG problems, it has meant a greater focus on them by these investment actors. In this way, many analysts are beginning to discover that traditional financial analysis, based on cash flows, book value, assets versus liabilities, among others, may not fully reflect some aspects of a company. ESG-based approaches that analyses the rating of performance against corporate environmental, social and governance criteria provide added value, as they provide data that traditional financial analysis does not reflect.

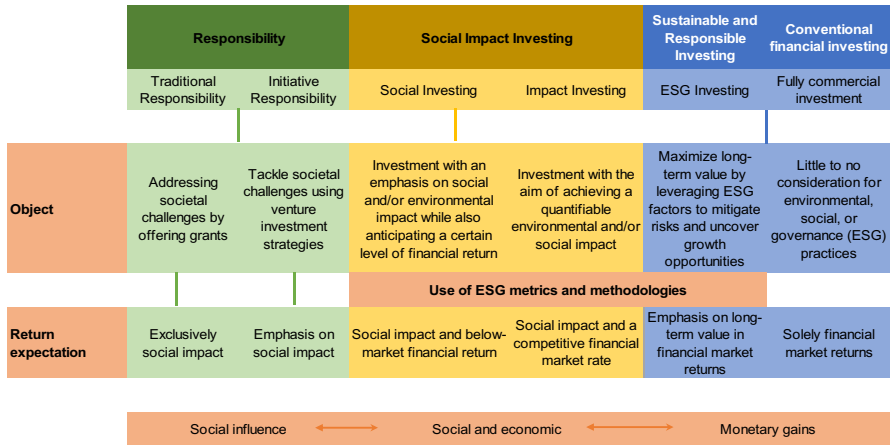


Fig. 3 Social impact investment 2019. Source: Own preparation from Social Impact Investment 2019

However, the relationship between credit quality and for example its performance in safety or energy efficiency criteria is complex. Credit quality is a function of profitability, productivity, competitive position, as well as your future projections, but these elements can (and should) be related to ESG factors. The difficulty lies in calculating the impact that ESG criteria can have on a company’s credit quality. Regulatory changes in relation to climate change can lead to an increase in the capital consumption that companies must book and can wear down their operating margins. Also, pollution fines can mean an outflow of cash flows.

Scandals such as child labor, fraud or corruption cases can deteriorate brand value and decrease consumer and investor interest in certain firms, which can deteriorate their future credit quality. All the above has meant that the assessment of ESG criteria should be considered in the financial analysis of non-financial corporations.

Investors consider ESG factors for different reasons. Some only see them from a purely economic or financial point of view of risks and opportunities. Others analyze them not only as risks and opportunities, but as a matter of ethical and moral values. Finally, other investors consider ESG factors as a complement to their financial analysis. These different points of view can coexist in an analysis where these ESG factors can be included and considered. In Fig. 3 below, of the OECD (2019), the different investment modalities are exposed, reaching from a total philanthropy, where there is no search for a return on investment, to a conventional financial investment whose main objective is the search for financial profitability without taking into account ESG criteria, criteria that consider that the only social responsibility of the company should be the maximization of profit for the shareholder, and that is based on a mistaken belief that sustainable investment would mean sacrificing some financial return. On this path from one investment modality to another, different degrees of philanthropy can be distinguished and found, with a social impact or return only without having a focus on obtaining investment returns. From there, new actors emerge with social investment modes, but with a financial return where these ESG metrics are considered. These investment methods would mix the pursuit

of a financial objective, but with social impact criteria where the consideration of ESG metrics is fundamental. Finally, before reaching an investment solely focused on a financial return, we have sustainable and responsible investment where financial profitability is sought, but with a long-term focus, where ESG criteria serve to mitigate risks and look for opportunities that may be found. These methods in their different varieties seem to be the current trend of investors, beginning to leave aside investors purely focused on financial investment that do not have into consideration the ESG criteria.

However, a problem that arises is that these ESG indicators do not completely match with the short-term vision that prevails in financial operations, since ESG principles affect or can affect over a longer period than the potential impacts on a corporation's financial indicators. In this way, there is a temporal asymmetry between financial principles (shorter terms) and sustainability principles (longer terms). Finding a link between both criteria is a difficulty that entails the implementation, with bigger or minor success, of the importance of ESG criteria in the different actors of the economy. For example, poor governance of a company may have more impacts in the medium or long term than in the next quarter or thinking about an investment project Capex (Capital Expenditure) where first the investment that involves spending is undertaken and then in the medium term has an impact on the financial return.

The discourse on ESG issues is based on the premise that these issues, particularly environmental and social issues, do not receive sufficient consideration or interest in investment decisions. Several reasons are given to explain why this is the case. We highlight three:

- It is difficult to allocate a monetary value to ESG issues and integrate them into predictive financial models.
- Disclosure of ESG-related information by companies may be limited, unverified and non-standardized.
- ESG issues tend to influence long-term financial performance, while many investors, as suggested above, have relatively short-term horizons.

Despite these challenges, consideration of ESG factors is becoming more common. Evidence points out an increase in awareness of ESG issues in investment decisions by companies or investment actors in markets. A well-known indicator of the growing awareness of ESG indicators is the rapidly growing list of participants of the United Nations-supported Principles for Responsible Investment (PRI), the main framework for investors wishing to integrate ESG considerations into investment decision-making.¹⁰

One thing that is happening is that impact investing is considered, along with ESG investing, as a form of sustainable financing, because it seeks to generate a positive social return that is measurable and reportable, along with a financial return.

In this regard, the use of ESG metrics and approaches within companies' sustainable investment plans can be done to also obtain long-term value. That would

¹⁰ Principles for Responsible Investment.

be the merger of financial and sustainability criteria where time horizons are not necessarily married. An example would be sustainable impact investing that seeks more financial returns in the short term, rather than explicitly improving long-term returns. This remains a source of ambiguity, as the time horizons between purely financial profitability and financial profitability that incorporates sustainable criteria have contributed to the proliferation of ESG metrics and methodologies that serve different purposes. On the contrary, more and more studies reveal a positive relationship between sustainability and profitability (Eccle et al., 2014; Khan et al., 2016). Above all, it has been shown that the non-inclusion of these sustainability criteria will lead to a lower realization of benefits (Charlo Molina et al., 2013). Likewise, actions have appeared by market actors, known as “greenwashing”, where investors carry out a “green” practice aimed at creating an illusory image of ecological responsibility, when their responsibility to the environment is not such, but what they intend to obtain resources and financial returns, with the incentive of an apparent responsibility in sustainability. This term can be defined as the intersection of two business behaviors: poor environmental behavior and positive communication about environmental performance (Delmas & Blass, 2010). Therefore, to achieve awareness of the sustainability of the economy in the productive and financial markets, it is important that there are also:

The transition from shareholder to stakeholder has challenged the notion that the company only serves shareholders, as the needs of other stakeholders have fostered the growth of corporate social responsibility in companies and even government entities. In this way, companies, due to the increase in regulatory requirements and the change in markets, are modifying their strategy, combining financial reports only to include long-term sustainability information.

This has invited reporting and action on ESG-related issues, which have no clear relationship to short-term financial returns. However, these ESG criteria are believed to contribute to long-term value, to strengthen reputation, brand loyalty and talent retention. This makes special sense under stakeholder theory (Tarmuji et al., 2016). If a company ignores stakeholder preferences, it will have a negative effect on its reputation, which will cause an increase in its risk premium and the risk of return of its financial results. Thus, in Fig. 4: preference of interest groups, generational interest in ESG criteria can be observed. Millennials have 85% moderate and high interest. This contrasts with generation X (older) where interest decreases to 11%. In Generation X and baby boomers, interest is between 73 and 47% moderate and high interest. This growing interest in younger generations will boost social demands for ESG criteria in investments and companies.

The increased demand for social impact has meant that investors request data related to factors E, S and G, related to good practices. In this way, the project “Carbon Disclosure Project (CDP) (2020) (include references)”, comes from a non-profit organization that manages an environmental disclosure system worldwide. It is considered as a benchmark in the disclosure of non-financial information. It has a large amount of data on the performance of companies. It can be seen in the following graph Fig. 5. Growth in disclosing companies, how, also due to the increased demand for information from investors, companies have increased the reporting of this type of information. However, we are in a moment of over information, which

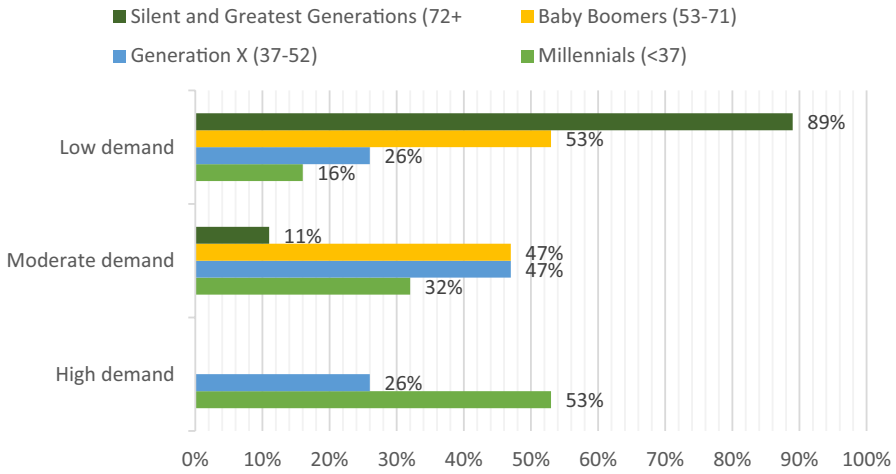


Fig. 4 ESG investing demand by generation. Source: Prepared by the author based on Tucker III & Jones (2020)

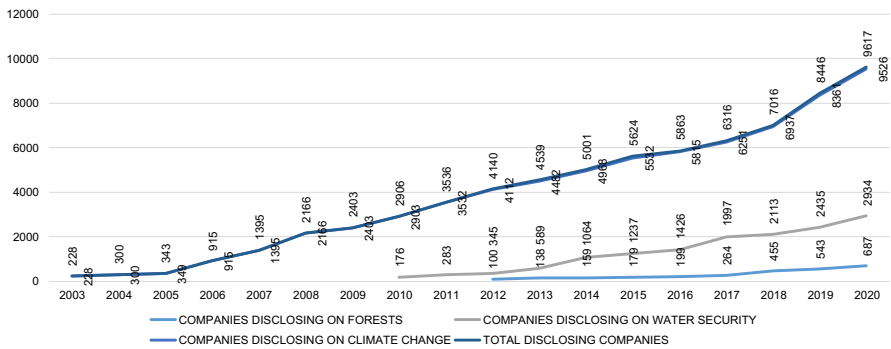


Fig. 5 Growth in disclosing companies 2003–2020. Source: CDP, The A List 2020

makes it difficult to detect relevant information for investors and to generalize ESG investment strategies.

The demand for ESG has meant that investors are interested in responsible investing to adopt a more sustainable perspective, which can benefit both ESG risk management elements and better align with social values. In this way, with a greater commitment on the part of all actors, companies, consumers, public administrations, and regulators, it is possible to incorporate these ESG metrics and to a greater awareness and commitment to be able to reach a sustainable economy with the environment, social and with adequate governance.

Banks that, at the behest of their creditors, often including multilateral organizations and development banks, are adopting environmental policies and Environmental and Social Risk Assessment (ESRA) management systems represent a significant

and positive shift in the financial sector. These banks are taking proactive steps to align their operations with global sustainability goals, recognizing the pressing need to address environmental and social considerations in their lending and investment activities. By implementing ESRA management systems, they aim to evaluate and mitigate potential environmental and social risks associated with their portfolios, thereby fostering sustainable development and responsible banking practices. This transition not only underscores the growing importance of ESG factors in the financial industry but also reflects a commitment to a more sustainable, equitable, and environmentally conscious financial landscape.

These systems encompass an exclusion list that identifies industries which are used to filter out clients not in compliance with these specific criteria. In the case of other clients, a comprehensive assessment of ESG factors is conducted. While these factors may not automatically disqualify clients from receiving credit, they are strongly encouraged to align their practices with the bank's environmental policy and ESRA system. This alignment serves the dual purpose of reducing risks that could impact both the clients' and the banks' financial stability. To effectively detect and manage these risks, early warning systems, due diligence processes, and precise calculation methodologies become imperative. Ultimately, financial institutions must consider the potential financial impact of ESG risks and establish risk mitigation measures in line with Basel recommendations to ensure the solvency and liquidity of the banks.

4 ESG and non-financial reporting regulations

Investors can consider ESG issues in their investment decisions only if they have timely information to do so. Currently, mandatory corporate disclosure provides limited information on ESG-related risks and opportunities. On the other hand, it is added that ESG-related information can be published at a different time than the financial statements, which makes integration difficult. However, it is worth noting that disclosure and data have improved.

Similarly, the availability of data is increasing, even if better quality and greater quantity are needed. The challenge of disclosing information on a voluntary basis is that companies can disclose and exaggerate only what reflects well on them and downplay or not disclose what is not. This behavior could limit ESG analysis and bias it in favor of disclosure rather than performance.

The central regulatory framework in this regard is the EU Taxonomy for Sustainable Activities, published in June 2020, which sets out the criteria for determining¹¹ whether an economic activity qualifies as environmentally sustainable. The key requirement is that an activity contributes substantially to one or more of the six defined environmental objectives and does not significantly damage any of these objectives (see Article 9):

¹¹ Regulation (EU) 2020/852, officially published in June 2020, contains the foundations of the common European classification system of environmentally sustainable economic activities, which in turn makes it possible to determine the degree of sustainability of an investment.

- (a) Climate change mitigation.
- (b) Adaptation to climate change.
- (c) Sustainable use and protection of water and marine resources.
- (d) The transition to a circular economy.
- (e) Pollution prevention and control.
- (f) The protection and restoration of biodiversity and ecosystems.

The EU taxonomy relates to the non-financial reporting requirements of companies and vice versa. It applies, *inter alia*, to companies that are subject to the obligation to publish a non-financial statement or a consolidated non-financial statement.

These are large public-interest entities, *i.e.* listed companies, banks and insurance companies, with more than 500 employees. Non-financial disclosure comprises three dimensions: environmental, social and governance (ESG).

It is established in the Non-Financial Reporting Directive (NFRD), the scope, reporting rules, review of information by a third party and digitization.

The proposed text of the NFRD revision is set out in the recently published Corporate Sustainability Reporting Directive (CSRD),¹² which builds on and revises the sustainability reporting requirements set out in the Non-Financial Reporting Directive (NFRD) to make sustainability reporting more consistent with the broader legal framework of sustainable finance, including the Sustainable Finance Disclosure Regulation (SFDR) (European Commission, 2023) and the Taxonomy Regulation. In addition, the proposal aims to build on and contribute to establish international sustainability reporting initiatives, such as the Task Force on Climate-Related Financial Disclosure (2023) or the Global Reporting Initiative (GRI). In this context, the proposal of the International Financial Reporting Standards Foundation (IFRS Foundation) to create a new Sustainability Standards Board (IFRS) is also cited as particularly relevant. The expected consistency and alignment of reporting requirements will be achieved through the proposed European sustainability reporting standards, which will be developed by the European Financial Reporting Advisory Group (EFRAG).

In terms of scope, the CSRD requires obliged entities to report public interest entities to all large companies, regardless of whether they contribute and leave out the previous threshold of 500 employees, which they will have until January 1, 2026, to comply with the reporting requirements. In addition, listed SMEs will also be included, except for listed micro-enterprises, but with simpler reporting rules than those of large companies. Secondly, it will apply to EU “large companies” or EU subsidiaries of non-EU companies. A “large enterprise” is a term defined in the Accounting Directive and refers to an entity that meets two of the following three criteria: a net turnover of more than EUR 40 million; balance sheet assets exceeding €20 million; or have more than 250 employees. The CSRD shall apply to insurance undertakings and credit institutions irrespective of their legal form.

¹² Directiva sobre información corporativa en materia de sostenibilidad, European Parliament legislative resolution of 10 November 2022 on the proposal for a Directive of the European Parliament and of the Council amending Directive 2013/34/EU, Directive 2004/109/EC, Directive 2006/43/EC and Regulation (EU) No 537/2014, as regards corporate sustainability reporting.

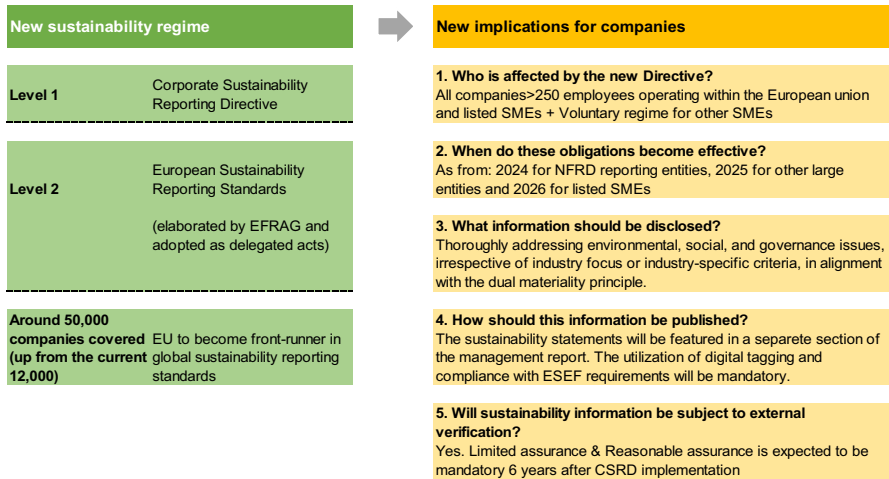


Fig. 6 New sustainability reporting regime. Source: Own prepared based on EY: How the EU’s new sustainability directive (“CSRD”) is becoming a game changer. https://www.ey.com/en_ro/news/2022/11/how-the-eus-new-sustainability-directive-is-becoming-a-game-chan

The proposal also introduces for the first time a general audit requirement with limited assurance for a few years, which will become more detailed (reasonable assurance) in 6 years at EU level for reported sustainability reporting. This will help ensure that the information reported is accurate and reliable.

In summary, all large companies and those listed on EU regulated markets, except listed micro-enterprises, will have to comply with the directive, which will enter into force on January 1, 2023. Listed small and medium-sized enterprises (SMEs) have a period of three years to comply with it. The directive gives greater responsibilities to management teams, audit committees and statutory auditors.

In addition, the proposal anticipates the increasing digitization of sustainability information and would require companies to prepare their financial statements and management report in XHTML format in accordance with the ESEF Regulation.

While the taxonomy constitutes the overarching concept of environmentally sustainable activities, the CSRD addresses the financial implications of all sustainability risks (ESG) but establishes the relevance of climate-related financial risks.

However, it is noted that awareness of the risks of other environmental and social problems is also increasing. The CSRD explicitly clarifies the financial relevance of sustainability information. It introduces and defines the terms “sustainability issues” and “sustainability reporting,” while the NFRD’s existing provisions refer to “non-financial information.” With this change of terms, the CSRD eliminates the implication that sustainability information has no financial relevance.

Also, as shown in Fig. 6, the CSRD once again emphasizes the principle of double materiality in line with the NFRD, which means that companies must report the information necessary to understand how sustainability issues affect

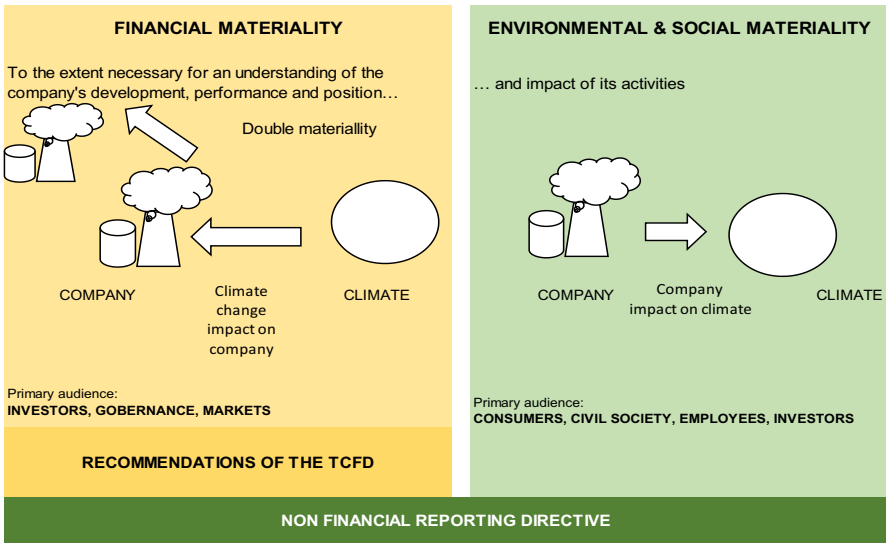
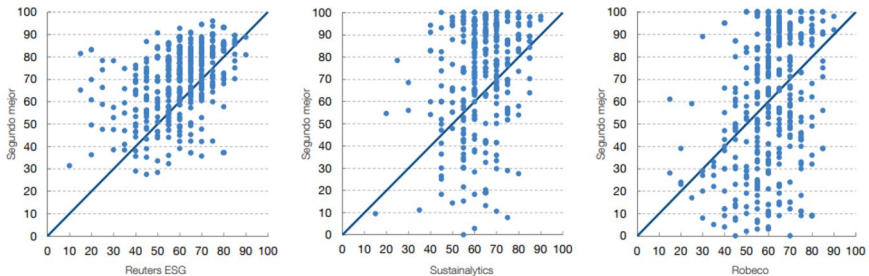


Fig. 7 The perspective of the dual materiality of the non-financial reporting directive in the context of climate-related reporting. Source: Own prepared based on guidelines for climate-related information (European Commission 2019)

Gráfico 8
CORRELACIÓN ENTRE RATINGS DE CRÉDITO Y RATINGS VERDES

Las correlación entre las valoraciones de las agencias de crédito y las de sostenibilidad es muy baja.

1 SEGUNDO MEJOR RATING FRENTE A REUTERS ESG 2 SEGUNDO MEJOR RATING FRENTE A SUSTAINALYTICS 3 SEGUNDO MEJOR RATING FRENTE A ROBECO



FUENTES: Moody's, Fitch, Standard & Poor's, Reuters, Robeco y Sustainalytics.

Fig. 8 Correlation between credit ratings and green ratings. Source: Gimeno and Sols (2020)

them, and the information necessary to understand the impact they have on people and the environment (Figs. 7, 8).

The concept of sustainability as used in the EU taxonomy, NFRD and CSRD is therefore broad and comprehensive. However, Climate Change Risks (CCRs) are

covered by both the taxonomy and the reporting directives. In the NFRD, respectively, the CSRD, the CCRs fall under the “environment” dimension. To what extent CCR information can be extracted separately from the company report will depend on the European sustainability reporting standards currently being developed.

In addressing disclosure standards, the CSRD explicitly refers to the work of the Working Group on Climate-related Financial Disclosures (TCFD). The TCFD was established by the Financial Stability Board and published climate-related financial disclosure recommendations in 2017. The key objective is better disclosure of an organization’s financial impacts of climate-related risks and opportunities and how these risks and opportunities are likely to affect the organization’s future financial positions (income statement, cash flow statement and balance sheet). The recommended disclosure will help investors and companies consider longer-term strategies and more efficient capital allocation considering the potential economic impacts of climate change. TCFD’s clear outline of climate-related risk, with its focus on the impact on a company’s financial positions, could be used as a model for a definition of CCR for a rating agency.

The potential financial implications of climate change identified by the TCFD show the widely shared division between transition risks to a low-emission economy and physical risks.

Physical risks can occur from acute weather events or present chronic risks due to changing weather patterns and rising average temperature and sea level. The TCFD classifies the risks of transition to a low-emission economy as follows:

- Policy and legal: financial impact of carbon pricing, reporting obligations, regulations of existing products and services, exposure to litigation.
- Technology: financial impact of replacing existing products and services with lower emission options, failed investment in new technologies
- Market: financial impact of changing customer behaviors, uncertainty in market signals, rising cost of raw materials
- Reputation: financial impact of changing consumer preferences, increased stakeholder concern/negative comments, stigmatization of the sector.

However, climate change can also generate opportunities in the following areas:

- Resource efficiency: use of transport modes, more efficient production, and distribution processes, use of recycling, transfer to more efficient buildings, reduced use and consumption of water.
- Energy source: use of low-emission energy sources, use of supportive policy incentives, use of new technologies.
- Products and services: development and/or expansion of low-emission goods and services, development of climate adaptation solutions, development of new products or services through R + D and innovation.
- Markets: access to new markets, use of public sector incentives.

Table 1 Summary of common climate-related risks and opportunities. Source: Own prepared from TCFD. Phase I Report of the Task Force on Climate-Related Financial Disclosures. Accessed March 31, 2016. <https://www.fsb.org/wp-content/uploads/TCFD-Phase-1-report.pdf>

Description	Physical Risk		Nonphysical Risk			Opportunities	
	Severe	Long-lasting	Policy/Legal/Litigation	Technology	Market/Economic	Reputation	
	The physical impact of more intense weather events on investments	The physical impact of more frequent catastrophic events	All targets, mandates, legislation, and regulations at the international, national, and subnational levels aimed at addressing climate change, which encompass potential risks associated with policy-driven shifts toward a low-carbon economy	The pace of technological advancements and investments in support of a low-carbon economy or the reduction of carbon emissions (transition risks)	Alterations in supply, demand, or competitive dynamics, the possible revaluation of carbon-intensive financial assets, and the rapidity of such revaluation.	Harm to one's financial or non-financial reputation resulting from a direct or indirect connection to an asset or company.	The economic advantages for companies, investors, and economies resulting from policy, market, and technology-led shifts towards a more sustainable, low-carbon economy, encompassing both climate adaptation and mitigation strategies.
Financial Impacts	Disruptions to operational processes, transportation, supply chains, distribution networks, etc., as well as damage to physical assets	The degradation or restrictions on the availability of resources can impact companies and investments that rely on these resources	Costs related to compliance, liabilities, limitations on the use of carbon-intensive assets, investments in new technologies, stranded assets, and asset impairments can impact the value of operational assets and investments.	Write-offs of investment in existing technologies, necessary investments in new technologies, operational and process modifications to accommodate these new technologies can influence the value of operational assets and investments	The sustainability of specific business models, company or securities valuations, and asset impairments can impact the value of operational assets and investments	Harm to brand reputation, revenue loss, and extra costs	Enhanced natural resource efficiency, improved operational effectiveness, cost savings, the discovery of new revenue sources, increased demand for new products, potentially better market liquidity through improved pricing and transparency, accelerated technological innovation, and reduced asset impairments due to increased investment in climate-resilient infrastructure

- Resilience: participation in renewable energy programs and adoption of energy efficiency measures, substitution/diversification of resources.

Both risks and opportunities should be considered in an entity's strategic risk management planning, as they could have a financial impact and therefore affect an organization's future financial positions (income statement, cash flow statement, and balance sheet) (Table 1).

At the national level, Law 11/ 2018, which transposed the NFRD into Spanish law, establishes that the consolidated Non-Financial Information Statement (NFIS) will include the information necessary to understand the evolution, results and situation of the group, and the impact of its activity with respect to environmental and other issues and more specifically it will include:

1. A brief description of the Group's business model, including its business environment, organization and structure, the markets in which it operates, its objectives and strategies, and the main factors and trends that may affect its future development.
2. A description of the policies applied by the group with respect to such matters, including the due diligence procedures applied for the identification, assessment,

- prevention, and mitigation of significant risks and impacts and verification and control, including what measures have been taken.
3. The results of those policies, including relevant non-financial key performance indicators to monitor and evaluate progress and to promote comparability between companies and sectors, in accordance with the national, European, or international reference frameworks used for each subject.
 4. The main risks related to those issues linked to the group's activities, including, where relevant and proportionate, its business relationships, products or services that may have negative effects in those areas, and how the group manages those risks, explaining the procedures used to identify and assess them in accordance with national frameworks, European or international reference for each subject. Information should be included on the impacts that have been identified, providing a breakdown of these, on the main risks in the short, medium, and long term.
 5. Non-financial key performance indicators that are relevant to the business activity, and that meet the criteria of comparability, materiality, relevance and reliability. To facilitate the comparison of information, both over time and between entities, standards of key non-financial indicators that can be generally applied and that comply with the guidelines of the European Commission in this matter and the standards of the Global Reporting Initiative will be used, and the national framework must be mentioned in the report, European or international used for each subject. The key non-financial performance indicators should apply to each of the sections of the non-financial reporting statement. These indicators should be useful, considering specific circumstances and consistent with the parameters used in their internal risk management and assessment procedures. In any case, the information submitted must be accurate, comparable, and verifiable.

The Act provides that the consolidated NFIS shall include significant information on environmental matters:

1. Detailed information on the current and foreseeable effects of the undertaking's activities on the environment and, where applicable, health and safety, environmental assessment or certification procedures; resources dedicated to the prevention of environmental risks; the application of the precautionary principle, the number of provisions and guarantees for environmental risks.
2. Pollution: measures to prevent, reduce or repair carbon emissions that seriously affect the environment; considering any form of air pollution specific to an activity, including noise and light pollution.
3. Circular economy and waste prevention and management: measures for prevention, recycling, reuse, other forms of waste recovery and disposal; Actions to combat food waste.
4. Sustainable use of resources: water consumption and water supply according to local constraints; consumption of raw materials and measures taken to improve the efficiency of their use; direct and indirect energy consumption, measures taken to improve energy efficiency and the use of renewable energies.

5. Climate change: the significant elements of greenhouse gas emissions generated as a result of the company's activities, including the use of the goods and services it produces; measures taken to adapt to the consequences of climate change; the reduction goals established voluntarily in the medium and long term to reduce greenhouse gas emissions and the means implemented for this purpose.
6. Protection of biodiversity: measures taken to preserve or restore biodiversity; impacts caused by activities or operations in protected areas.

It will also provide information on subcontracting and suppliers: the inclusion in the procurement policy of social, gender equality and environmental issues; consideration in relations with suppliers and subcontractors of their social and environmental responsibility; monitoring systems and audits and their results.

As indicated in the Law itself, standards of key indicators that comply with the guidelines of the European Commission on non-financial reporting—Methodology for non-financial reporting—(2017/C 215/01)¹⁰ (European Commission, 2017), and the standards of the Global Reporting Initiative will be used.

A framework that is currently garnering significant attention and momentum in the global financial sector for assessing environmental risks is the Taskforce on Nature-related Financial Disclosures (TNFD). Building on the success and structure of its predecessor, the Task Force on Climate-related Financial Disclosures (2023), the TNFD aims to provide a standardized framework for businesses and financial institutions to evaluate and disclose their nature-related risks and dependencies. This framework recognizes the critical importance of biodiversity, ecosystems, and the natural world to financial stability and long-term sustainability. By developing guidelines and metrics for assessing nature-related financial risks, the TNFD is poised to play a pivotal role in shaping the way businesses and investors incorporate environmental considerations into their decision-making processes, ultimately fostering more resilient and responsible financial practices.

5 Consideration of ESG factors by credit rating agencies./ESG factors and credit rating agencies

As for credit rating agencies, they already incorporate ESG risks into their credit ratings. In this way, rating agencies evaluate each factor (E, S and G) independently. In addition, these agencies are beginning to disclose and report their methodologies to the markets regarding ESG risks and how they impact credit ratings. Incorporating granular analysis, ESG ratings can demonstrate how an institution's commitment to sustainability can affect its credit risk, as well as its long-term resilience in environmental, social and governance areas. We are in a world in transition to a sustainable economy, and therefore companies with more effective ESG risk management will have greater value in the long term. The main ESG ratings do not focus on the impact that a company has on its environment but assess the risk in financial terms derived from the management of these ESG aspects.

In this way, the four largest credit rating agencies (Moody's, Standard & Poor's, Fitch and DBRS) incorporate ESG risks into their ratings and try to assess how they

can have an impact on companies. Fundamentally, they focus on physical risks and transition risks.

Thus, all rating agencies have developed an ESG assessment framework that covers certain ESG credit risk factors grouped into these three categories.

The four ECAI assess these ESG impacts from an industry- and asset-specific overview and view to define the relevance and materiality of these ESG factors. Not all ESG risk factors necessarily apply to each sector's methodology.¹³

In Table 2, and as an example, you can find a comparison of the indicators of environmental factors and climate change risks used by the four main ECAIs. All ECAI evaluate similar concepts in terms of environmental indicators, although differences can also be found. In this way, greater consistency and comparability between the different ratings would be desirable, so that the extent of how these ESG criteria affect a company's rating, the measurement of the attributes and the weights assigned to each of them could be recorded. The measurement divergence occurs when rating agencies measure the same attribute but including different variables or KPIs.¹⁴ The divergence of weights appears when agencies differ in the relative importance and therefore in the weight they assign to the attributes. This divergence of weights and weights may be the main reason for the different impacts that ESG criteria can have on companies' final ratings. For its part, the European Securities and Markets Authority (ESMA)¹⁵ has asked the European Commission (EC) to carry out regulatory impulses in the field of ratings (ESMA, 2021). It stresses that in order to ensure the quality and reliability of ratings and to meet the growing demand for them, appropriate regulation is necessary. ESMA believes that a common definition of sustainable ratings should be established covering the broad spectrum of possible ESG assessments.

Rating agencies incorporate all relevant aspects with a forward-looking point of view, in such a way that they try to quantify how much ESG factors could impact in the future, which may not necessarily be the same as it could have been in the past. While it is not feasible to quantify these impacts accurately, agencies attempt to incorporate them into ratings through qualitative analysis. All ECAI produce ESG heat maps. These heat maps indicate the materiality of ESG risks for credit quality and provide a relative ranking of sectors.

This approach acknowledges that ESG factors can vary significantly from one industry to another, and thus, a one-size-fits-all rating system may not capture the nuances of a company's performance within its specific sector. By employing sectoral analysis, credit rating agencies can provide a more accurate and contextually relevant assessment of a company's ESG performance. This practice not only encourages businesses to strive for sector-specific sustainability goals but also allows investors to make more informed and nuanced decisions when assessing the creditworthiness of companies operating within diverse industries.

There is a growing demand from regulators, as well as the broader market, for credit agencies to report greater transparency in how they incorporate ESG risks

¹³ External Credit Assessment Institutions.

¹⁴ Key Performance Indicators.

¹⁵ European Securities and Market Authority.

Table 2 Comparison of indicators of environmental factors and climate change risks used by the four main ECAI. Source: Own elaboration based on the methodologies of the agencies

	MOODY'S	S&P	FITCH	DBRS
1	Air pollution & carbon emissions regulations	Greenhouse gas emissions	Greenhouse gas emissions & air quality	Carbon emissions and greenhouse effect
2	Land pollution—restrictions on use	Biodiversity, water and land use	Energy management	Biodiversity and impact on soil
3	Water pollution water scarcity	Pollution and waste	Water and water waste management	Sewage waste resources and management
4	Natural hazards and human impact	Natural conditions (exposure to adverse weather conditions)	Exposure to environmental impacts	Climate risks

into their ratings. Thus, both Moody's and S&P recently announced their intention to improve existing communication to the market on the extent to which ESG factors influence credit ratings.

In addition, there are “pure ESG” ratings. These sustainability ratings are defined as evaluations of the performance shown by the company analyzed on ESG risk management. These are scores assigned to companies based on a range of scores, which shows the level of compliance in the different variables taken into account for the final ESG score. To obtain a sustainability assessment, the company's public information is based on a high number of ESG indicators that allow obtaining this ESG rating. Each agency collects, aggregates and weights this information in a different way by carrying out its own evaluation process. In this way, each agency has developed its own process to measure the sustainability commitment of companies. Major ECAI have recently acquired or incorporated new subsidiaries/equipment into their structures, in order to provide, in addition to different products to clients, ESG risk ratings. These purely ESG assessments are not comparable with each other, there are clear differences among them, without having a harmonized methodology. It should be kept in mind that ESG disclosure is at an early stage in terms of regulation, and this may be causing these differences.

ESG assessment is a forward-looking view of the ability to manage future ESG risks and, in some cases, opportunities, and the extent to which companies take into account and manage material ESG factors. All ECAI's, except Fitch, have constructed a quantitative score considering different ESG criteria. According to these scores, companies are grouped into different risk categories. Moody's and S&P assign scores from 0 to 100, while DBRS assigns scores from 0 to 40+. These scores allow users to identify the strongest and weakest points and how they expose companies to different types of risk. In this line, it is worth paying attention to MSCI, a company specialized in ESG ratings, with more than 40 years evaluating the ESG performance of companies. Its ratings are designed to measure a company's resilience to significant long-term industry ESG risks.

While ESG risks are a source of financial risk, rating agencies incorporate these risks into their credit ratings. However, according to Ricardo Gimeno and Fernando Sols in "The incorporation of sustainability factors in portfolio management"¹⁶ they have observed the low correlation between credit ratings and ESG risk assessments:

The authors point out that this difference may be due to the different time horizon between the two metrics. While credit ratings have a 2–3 year horizon, climate risks (valued in ESG risk assessments) have a longer horizon because of their probability of materializing.

With all the above, the methodologies are different between rating agencies when it comes to incorporating ESG risks into credit ratings, as well as between agencies that prepare ESG risk assessments. But additionally, it is important to note that there is no relationship between both final products, and the reasons behind why they are different, must be taken into account by the users.

¹⁶ https://www.bde.es/f/webbde/GAP/Secciones/Publicaciones/InformesBoletinesRevistas/RevistaEstabilidadFinanciera/20/Factores_sostenibilidad.pdf.

Alongside rating agencies, audit schemes such as EMAS (Eco Management and Audit Scheme) have evolved. EMAS is an EU voluntary environmental management instrument and certification that assesses a company's environmental performance. The EU Commission emphasizes the importance of EMAS in its Non-Financial Reporting Guidelines.

The European Commission created EMAS in the 90 s as an environmental policy tool being a step towards meeting the Community objective of sustainable development. Several European regulations have been developed in this regard. The scope of the current EMAS regulation is all sectors of economic activity, including local authorities, and the integration of the international standard of the environmental management system EN ISO 14001. EMAS is a certification that increases a company's environmental performance, while enhancing its "green" image with transparent and validated reporting. It helps an organization save resources and money and meet environmental requirements. It is the EU's voluntary environmental management instrument that helps organizations achieve environmental performance. Companies that join EMAS have to publish an annual report on their performance, called "The Environmental Statement". This report includes information on the organization's environmental impacts and its actions to reduce them. It is publicly available and verified by an independent EMAS verifier. These companies are subject to an environmental audit in a period not exceeding three years.

The basic environmental indicators to be reported by companies have been introduced for a more harmonized and comprehensive consideration of environmental problems. The six core indicators reflect direct environmental aspects that are assessed over time.

EMAS also produces sectoral reference documents that include environmental management best practices, environmental indicators, and benchmarks of excellence. These documents are open to any organization wishing to improve its environmental performance.

6 Conclusions

The research to register the business activity of companies led to the emergence of financial accounting, which attempts to record the operations of companies with different motives and reasons. This financial information disclosed by companies fostered the development of accounting regulatory systems in different countries. Recently, there has been a process of accounting harmonization through international financial reporting standards and their subsequent transposition into national regulations. This process of standardization and standardization of financial information has been carried out and companies report in a unified way and with specific models in their financial statements. This process is the result of a regulatory development that in Spain is reflected in the different General Accounting Plans since 1973, 1991 and later that of 2007, where an attempt was made to resemble the national standard to European and international standards.

We have, therefore, a long regulatory process of financial accounting regulation over almost 50 years where it has been achieved, with greater or lesser success,

greater transparency, traceability, and harmonization of financial information of companies (Gupta et al, 2019).

Similarly, the public has become aware of the importance of sustainability and how companies' environmental actions can have negative consequences for the environment, the planet, the people and how can affect the demand for products.

Consequently, investors express their concern about sustainability information, but also focus on the lack of clear, accurate and homogeneous information that allows them to know how sustainable an asset or company is (Eccles and Strohle, 2018).

It is essential, both for investors and for companies, to know the methodologies of the different providers of ratings and ESG indicators and indices, to know their methodologies for calculating the indicators, since it may be the case that the same indicator can mean the quantification of an impact or in another rating agency can mean performance. For example: the indicator "ESG risk" measures risk and the same indicator for "Refinitiv Eikon (2022)" (Thomson Reuters) measures performance.

Decisions by investors should not be taken solely based on a single source of information. In order to know how sustainable a company or asset is, ratings that take into account these sustainability criteria are very useful, but these are based on different methodologies with a lack of homogeneity and transparency, a situation that exacerbates the initial problem.

In addition, it is complex to condense and translate to the reader how an issue as disparate as ESG criteria can be refined and reduced in a single score.

The different weights that agencies give to the same factor within their respective methodologies, as well as different criteria taken into account in their analyses and evaluations, could be an element to take into account to understand the differences between market players. With the proliferation of ESG ratings and the lack of standardization around a homogeneous framework, it has caused high skepticism and ambiguity in the assessment of these risks. In this line, in an interview granted by the Norges fund to Bloomberg, it was said that¹⁷ ESG ratings were considered on "very few occasions". According to a study by the prestigious MIT Sloan school¹⁸, the correlation between six leading rating agencies (KLD/MSCI Stats, Sustainalytics, Vigeo Eiris/Moody's, RobecoSAM/S&P Global, Asset4/Refinitiv and MSCI) was found to average 0.61. By comparison, the main credit ratings of Moody's and Standard & Poor's have a correlation of 0.99. The findings of this study suggest that ESG ratings do not adequately reflect ESG performance, making it difficult for decision-makers to identify the best and laggards. The divergence in ratings also hampers companies' motivation to improve their ESG performance, the paper states, because there are conflicting signals from rating agencies about what to focus on and what is valued in the industry. In this way, the standardization of these analyses is very important.

¹⁷ <https://www.bloomberg.com/news/articles/2021-12-16/esg-ratings-scores-very-rarely-help-norway-wealth-fund-says>.

¹⁸ <https://mitsloan.mit.edu/ideas-made-to-matter/why-sustainable-business-needs-better-esg-ratings>.

A deeper insight into the obstacles faced in integrating ESG aspects into credit ratings reveals a multifaceted challenge that the financial industry is currently grappling with. One prominent obstacle is the lack of standardized and universally accepted ESG metrics and data. With various ESG reporting frameworks and a dearth of consistent data, credit rating agencies often encounter difficulties in comparing and assessing companies across sectors and regions. This inconsistency can lead to subjective interpretations and discrepancies in credit assessments. Another challenge is the relatively short-term horizon traditionally associated with credit ratings, while ESG considerations often revolve around long-term sustainability. This misalignment between the immediate financial focus of credit ratings and the broader, more extended timeframes of ESG factors can make it difficult to incorporate ESG assessments seamlessly.

Furthermore, the subjectivity of ESG factors and the interpretation of their materiality in specific sectors can pose a significant obstacle. Credit rating agencies must navigate the diverse opinions and priorities of various stakeholders when determining which ESG aspects are most relevant for a particular industry or company. Additionally, the potential for greenwashing and the lack of consistent verification mechanisms can raise concerns about the reliability of ESG data, making it challenging to ensure the accuracy and authenticity of the information used in credit assessments.

Lastly, overcoming the inertia of established credit rating methodologies and the resistance to change within the industry itself can also hinder the seamless integration of ESG factors. Many traditional credit rating agencies are adjusting their models gradually, and this transition can be met with resistance and scepticism, as it represents a departure from long-standing practices.

Overall, a deeper insight into these obstacles underscores the pressing need for standardization, enhanced data quality, and innovative methodologies to successfully incorporate ESG aspects into credit ratings, thereby aligning the financial industry with the growing demand for sustainable and responsible investment practices.

In parallel, a titanic effort has been made by regulators to create a reporting framework for this information by companies to ensure that these criteria have due importance and do not enter into skepticism on the part of users of this information. This current framework implies that most of the information reported is in the reports of unharmonized companies, which in many cases are not comparable and are not standardized. Regulators are working to get the information reported in the right line and have begun to require a set of standard indicators that all companies have to report.

With the current landscape, there are two fundamental tools that will make sustainability information a useful and efficient weapon: (i) the advancement of regulation that seeks a harmonization and homogenization of the information reported and (ii) the support of initiatives on the standardization of ESG assessments.

But it is not easy to find empirical evidence of whether there is a relationship between a company's credit risk or asset and ESG performance. Thus, although the credit ratings of the agencies give a probability of default or default based on financial ratios (very useful for the investor to calculate their expected probability of loss), in the case of sustainability ratings or how these factors can affect credit risks,

this relationship is not clearly identified. The main reason is the lack of homogenization of the data reported by companies, as well as the unavailability of a historical series of sustainability data with a scope at least similar to that of financial information.

One of the main causes of all of the above may be due to the difference between financial information, which has a historical regulation that validates and facilitates harmonization, homogeneity and comparability, and non-financial information in which we have a comparable situation of data, regulation and tradition that still does not exist today, or at least with the same detail and depth of the data.

In this way, we have an accounting regulatory framework in financial matters that has taken almost 50 years to achieve harmonization, and it is intended that in few years, companies will report with the same level (or even higher) of quality of information on sustainability data than eminently financial data. In addition, we intend that the use we make of sustainability data is the same as financial data, where there is already a standardization of the analysis and implications of certain financial concepts and ratios, a situation that is not yet fully known for non-financial sustainability information. We believe that it will be a gradual process where this will be achieved, with problems and challenges. Many solutions will have to be provided as records become available, and increasingly granular, comparable, harmonized, and homogenized information can be obtained that will allow this sustainability information to be useful and of quality. This regulatory framework for reporting sustainability information will accelerate to the extent that companies find that their income statements and profitability are affected by the lack of an environmental and sustainable development policy.

Thus, to the extent that the effect of global warming has impacts on the profitability of companies, and these physical risks and transition to a sustainable economy impact their profitability, it will imply that these regulatory frameworks for reporting sustainability information are valid, permanent, and useful.

Future work, in the context of the EU's European Green Deal and the Sustainable Finance Action Plan, will delve into the importance of non-financial information, defining a set of ESG factors that are material and significant and that may affect and impact different management indicators (cash flows, EBIT, among others) of a non-financial company (defined according to ESA2010). This work is part of a more exhaustive research work that will be completed in the future with an empirical investigation of a company and its sector of activity, to contrast the most relevant and representative ESG criteria that may affect and impact cash flows.¹⁹

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¹⁹ ESA 2010 (2.45): The "non-financial corporations" sector (S.11) is composed of institutional units with legal personality which are market producers and whose main activity is the production of goods and services not financial. The non-financial corporations sector also includes quasi-non-financial corporations.

Declarations

Conflict of interest The author has not disclosed any competing interests.

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References

- Almagtome, A., Khaghaany, M., & Önce, S. (2020). Corporate governance quality, stakeholders' pressure, and sustainable development: An integrated approach. *International Journal of Mathematical, Engineering and Management Sciences*, 5(6), 1077–1090.
- Aula, P. (2010). Social media, reputation risk and ambient publicity management. *Strategy & Leadership*, 38(6), 43–49. <https://doi.org/10.1108/10878571011088069>
- Aizebeokhai, A. P. (2009). Global warming and climate change: realities, uncertainties and measures. *International Journal of Physical Sciences*, 4(13), 868–879.
- Benedetti, D., Biffis, E., Chatzimichalakis, F., Fedele, L. L., & Simm, I. (2021). Climate change investment risk: Optimal portfolio construction ahead of the transition to a lower-carbon economy. *Annals of Operations Research*, 299(1), 847–871.
- Boffo, R., & Patalano, R. (2020). "ESG Investing: Practices, Progress and Challenges", OECD Paris. <https://www.oecd.org/finance/ESG-Investing-Practices-Progress-and-Challenges.pdf>
- Carbon Disclosure Project (CDP). (2020). The time to green finance disclosure insight action. CDP Financial Services. Disclosure Report 2020. <https://www.cdp.net>, <https://cdn.cdp.net/cdp-production/cms/reports/documents/000/005/741/original/CDP-Financial-Services-Disclosure-Report-2020.pdf?1619537981>
- Charlo Molina, M. J., Moya Clemente, I., & Muñoz Rubio, A. M. (2013). Factores diferenciadores de las empresas del índice de responsabilidad español. *Cuadernos De Gestión*, 2(13), 15–37.
- CNMV. (2014). Comision Nacional del Mercado de Valores. (Spanish Stocks Exchange Commission Authority). Good Governance of Listed (CGGLC) "Código de Buen Gobierno".
- Delmas, M., & Blass, V. (2010). Measuring corporate environmental performance: The trade-offs of sustainability ratings. *Business Strategy and the Environment*, 19(4), 245–260.
- Diaz, D., & Moore, F. (2017). Quantifying the economic risks of climate change. *Nature Climate Change*, 7(11), 774–782.
- Eccle, R., Ioannou, I., & Serafeim, G. (2014). The impact of corporate sustainability on organizational processes and performance. *Management Science*, 60(11), 2835–2857. <https://doi.org/10.1287/mnsc.2014.1984>
- Eccles, R.G., & Strohle, J. (2018). Exploring social origins in the construction of ESG measures (2018). Available at SSRN: <https://ssrn.com/abstract=3212685> or <https://doi.org/10.2139/ssrn.3212685>
- European Commission. (2017). European commission on non-financial reporting - methodology for non-financial reporting - (2017/C 215/01)10, and the standards of the Global Reporting Initiative will be used. Available at [https://eur-lex.europa.eu/legal-content/ES/TXT/PDF/?uri=CELEX:52017XC0705\(01\)&from=En](https://eur-lex.europa.eu/legal-content/ES/TXT/PDF/?uri=CELEX:52017XC0705(01)&from=En).
- European Commission. (2019). Guidelines on reporting climate-related information. Available at: https://ec.europa.eu/info/files/190618-climate-related-information-reporting-guidelines_en (europa.eu)
- European Commission. (2020). Study on sustainability related ratings, data and research. Available at <https://op.europa.eu/en/publication-detail/-/publication/d7d85036-509c-11eb-b59f-01aa75ed71a1>

- European Commission. (2023). Sustainable finance disclosure regulation (SFDR) and the taxonomy regulation. Sustainable finance disclosures regulation. Retrieved from https://finance.ec.europa.eu/regulation-and-supervision/financial-services-legislation/implementing-and-delegated-acts/sustainable-finance-disclosures-regulation_en
- European Parliament and Council. (2022). Corporate sustainability reporting directive (Directive (EU) 2022/2464 of the European Parliament and of the Council of 14 December 2022 amending Regulation (EU) No 537/2014, Directive 2004/109/EC, Directive 2006/43/EC and Directive 2013/34/EU as regards sustainability reporting by companies (Text with EEA relevance). Available at <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32022L2464>
- European Parliament and Council. (2014). Non-financial reporting directive (Directive 2014/95/EU of the European Parliament and of the Council of 22 October 2014 amending Directive 2013/34/EU as regards disclosure of non-financial and diversity information by certain large undertakings and groups. Available at: <https://eur-lex.europa.eu/eli/dir/2014/95/oj>
- European Stock Markets Authority. (2021). ESMA30-379-423. Retrieved from https://www.esma.europa.eu/sites/default/files/library/esma30-379-423_esma_letter_to_ec_on_esg_ratings.pdf
- European Union (EU). (2019). European Green Deal. Available at https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en
- Ford, J. D., Berrang-Ford, L., & Paterson, J. (2011). A systematic review of observed climate change adaptation in developed nations. *Climatic Change*, 106(2), 327–336.
- Gimeno, R. & Sols F. (2020). La incorporación de los factores de sostenibilidad en la gestión de carteras, nº39, p. 181–203. Revista de Estabilidad financiera Banco de España. Retrieved from: https://www.bde.es/f/webbde/GAP/Secciones/Publicaciones/InformesBoletinesRevistas/RevistaEstabilidadFinanciera/20/Factores_sostenibilidad.pdf
- Gupta, A., Boas, I., & Oosterveer, P. (2019). Transparency in global sustainability governance: To what effect? *Journal of Environmental Policy & Planning*, 22(1), 84–97.
- Gupta, A., & Mason, M. (2016). Disclosing or obscuring? The politics of transparency in global climate governance. *Current Opinion in Environmental Sustainability*, 18, 82–90.
- IPCC. (2007). Climate change 2007: Synthesis report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, Pachauri, R.K and Reisinger, A. (eds.)]. IPCC, Geneva, Switzerland, (p. 104).
- IPCC. (2023). Climate change 2023: Synthesis report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, H. Lee and J. Romero (eds.)]. IPCC, Geneva, Switzerland, pp. 35–115, doi: <https://doi.org/10.59327/IPCC/AR6-9789291691647>
- Kedward, K., Ryan-Collins, J., & Chene, H. (2022). Biodiversity loss and climate change interactions: financial stability implications for central banks and financial. *Climate Policy*. <https://doi.org/10.1080/14693062.2022.2107475>
- Khan, M., Serafeim, G., & Yoon, A. (2016). Corporate sustainability: First evidence on materiality. *The Accounting Review*, 91(6), 1697–1724. <https://doi.org/10.2308/accr-51383>
- La Porta, R., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. (2000). Investor protection and corporate governance. *Journal of Financial Economics*, 58(1–2), 3–27.
- Law 11/2018, of December 28, 2018 (Spanish Law) amending the Commercial Code, the revised Capital Companies Law approved by Legislative Royal Decree 1/2010, of July 2, 2010 and Audit Law 22/2015, of July 20, 2015, as regards non-financial information and diversity.
- Maucieri, C., Barbera, A. C., Vymazal, J., & Borin, M. (2017). A review on the main affecting factors of greenhouse gases emission in constructed wetlands. *Agricultural and Forest Meteorology*, 236, 175–193.
- Montzka, S. A., Dlugokencky, E. J., & Butler, J. H. (2011). Non-CO2 greenhouse gases and climate change. *Nature*, 476(7358), 43–50.
- Organisation for Economic Co-operation and Development Social Impact Investment 2019 (2019). The impact imperative for sustainable development. Retrieved from <https://www.oecd.org/development/social-impact-investment-2019-9789264311299-en.htm>
- Philander, S. G. (2008). *Encyclopedia of global warming and climate change: AE* (Vol. 1). Sage.
- Refinitiv. (2022). Environmental, social, and governance scores. Retrieved from Refinitiv. Retrieved from https://www.refinitiv.com/content/dam/marketing/en_us/documents/methodology/refinitiv-esg-scores-methodology.pdf
- Schuldt, J. P., Konrath, S. H., & Schwarz, N. (2011). “Global warming” or “climate change”? Whether the planet is warming depends on question wording. *Public Opinion Quarterly*, 75(1), 115–124.

- Semieniuk, G., Campiglio, E., Mercure, J. F., Volz, U., & Edwards, N. R. (2021). Low-carbon transition risks for finance. *Wiley Interdisciplinary Reviews: Climate Change*, 12(1), e678.
- Spain. (2006). Orden ECO/3722 de 26 de Diciembre. Código Conthe. Conthe Code updated in June 2013.
- Tarmuji, I., Maelah, R., & Tarmuji, N. H. (2016). The impact of environmental, social and governance practices (ESG) on economic performance: Evidence from ESG score. *International Journal of Trade, Economics and Finance*, 7(3), 67.
- Taskforce on Nature-related Financial Disclosures. (2023). Final TNFD Recommendations on nature related issues published and corporates and financial institutions begin adopting. tnfd.global. Retrieved from: <https://tnfd.global/final-tnfd-recommendations-on-nature-related-issues-published-and-corporates-and-financial-institutions-begin-adopting>.
- The European green deal elements. European Commission. (2020). https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en. European Union (EU)
- Tucker, III., & Jones. (2020). Environmental, social, and governance investing: Investor demand, the great wealth transfer, and strategies for ESG investing. *Journal of Financial Service Professionals*, 74(3), 56–75.
- UNFCCC. (2015). United Nations framework convention on climate change. Report of the Conference of the Parties to its twenty-first session, held in Paris from 30 November to 13 December 2015 FCCC/CP/2015/10/Add.1 (Agenda 2030, Paris Treaty). Retrieved from <https://unfccc.int/resource/docs/2015/cop21/eng/10.pdf>
- United Nations Framework Convention on Climate Change. (1992). Retrieved from: <https://unfccc.int/resource/docs/convkp/conveng.pdf>
- World Economic Forum. (2022). Global risks report 2022 the perspective of the dual materiality of the non-financial reporting directive in the context of climate-related reporting. Retrieved from https://www3.weforum.org/docs/WEF_The_Global_Risks_Report_2022.pdf

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