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Shaping a sustainable financial landscape through the integration of ESG factors into the evaluation of credit pricing

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INTRODUCTION

Individuals and institutional investors' interest in environmental, social, and governance (ESG) issues has grown significantly. Over the previous decade, the quantity of assets under management in socially responsible investment products has increased. This tendency is expected to accelerate given the ever-increasing importance that the Millennials and Z generations have posed and continue to pose on the subject. However, a firm grasp of the economic benefits of investing in ESG products still needs to be proved. Several studies have proven numerous favorable economic outcomes associated with ESG, including lower cost of capital, cost reduction, productivity increase, and profitability, to name a few. As elements impacting corporate creditworthiness, these could significantly impact corporations' credit risk indicators. This thesis aims to prove – through a UniCredit Case Study- that a company can decrease its cost of debt by pursuing the KPIs agreed upon with the lender, thus increasing its creditworthiness and decreasing the lender's credit risk.

The first chapter will provide a general overview of the ESG universe and its key components. Various distinctions of sustainability investments will be examined, focusing on the objective they pursue. The analysis will then concentrate on SRI, a long-term investing strategy aiming to combine environmental, social, and governance aspects while maintaining a financial return. In particular, the dissertation will present an overview of the six categories of strategies that try to include ESG factors in investors' decision-making processes. Following that, an examination of the work of the UN PRI will be carried out. It will specifically observe its yearly development, goals, and approach. At the end of the chapter, the emphasis will be on why investors should employ ESG in their investing decisions, as well as the myths surrounding integrating environmental, sustainable, and governance factors.

The relationship between ESG and creditworthiness will be the topic of the second chapter. Initially, it will focus on corporate social responsibility and the elements that influence corporate creditworthiness. The dissertation will focus on how ESG influences these elements and how credit risk indicators reflect this. In the second half of the chapter, a more in-depth examination of ESG and creditworthiness aspects will be conducted. Indeed, the analysis will focus on elements that may favor business creditworthiness, namely ESG, in relation to performance and cost of capital. Finally, the Merton model will be examined. This framework aids in understanding how various factors may influence a company's default probability.

The third chapter will focus on how banks progressively consider sustainability as a backbone of their risk management framework. Hence, most institutions strive to integrate ESG

components in their risk assessments, considering that ESG risks are not considered as a distinct type of risk but present themselves in other risk types. Furthermore, the analysis concentrates on how climate change influences bank business decisions in the sense that banks are subject to climate-related risks and opportunities due to their lending and investing activities since that banks that make loans to or invest in securities of corporates with direct exposure to climate-related risks accumulate risks through their loan book and equity holdings. In the second part of the final chapter, the dissertation will emphasize the topic concerning sustainability linked lending and all the implications that a company must encompass to enhance its creditworthiness and consequently lower its cost of debt and reduce the lender's credit risk. The Autostrade per l'Italia Case Study will foster this analysis. Moreover, the dissertation will be implemented with the construction of a Sectorial Heat Map, which takes as inputs the 4 macro-sectors in which UniCredit has granted sustainability linked loans. The final output of this analysis is to evaluate the exposure of the UniCredit portfolio - considering the companies to which it issued sustainability linked loans, namely Autostrade per l'Italia, FS, IVECO, Pirelli, and Stellantis- with respect to the Environemntal, Social, and Governance Pillars.

CHAPTER 1: LOOK CLOSELY AT ESG FACTORS

1.1 Overview of the ESG Factors

The concept of sustainability was introduced into the financial world at the end of the 20th century – particularly during 1997- when two German Universities released the "Frankfurt-Hohenheimer Guidelines." The document codified more than 850 criteria to evaluate companies' corporate responsibility in three main fields: social, environmental, and cultural. Starting from 2004, thanks to the collaboration of multiple financial institutions, the term ESG was coined and reached the economic landscape. This initiative aimed to develop guidelines to integrate better environmental, social, and governance matters in the asset management framework. These studies supported that firms that perform better in terms of ESG can boost shareholder value by better managing the risk associated with new ESG issues, anticipating governmental changes or consumer trends, and entering new markets or reducing costs.

As mentioned previously, the term ESG covers three different areas, each including various social sensitivity subfields. The acronym seeks to define a set of indicators for gauging the sustainability of the investment. The letter E represents Environmental matters, which include risks linked to climate change and carbon emission, water scarcity, and water and air pollution. Over the years, the importance of climate crises has increased: in 2015, at the United Nations Climate Conference (COP21), the first-ever global and legally binding climate change accord was announced. The long-term objective of the agreement focuses on keeping the increase in the global average temperature below 2°C and aiming at limiting it to 1.5°[1]. The S stands for Social and covers concerns related to gender and diversity, employee engagement, and consumer satisfaction. Ultimately, the G refers to corporate governance issues, including board structure and accountability, executive compensation, and corruption matters. The latter factor has gained relevance due to the financial crisis of 2008. Consequently, in 2009, the EU released the 2009/138/EC directive, also known as the Solvency II Directive, which raised awareness of governance and risk management issues[2].

Therefore, there needs to be a precise framework that categorizes the nature of the ESG issues since they are interchangeable and vary across regions and industries. These factors serve as a

[1] Carney, 2019
[2] Directive 2009/138/EC

screening criterion to evaluate an investment's sustainability[3]. Some examples of ESG issues are reported in Table 1.

Table 1. Examples of ESG Issues

Environmental Issues	Social Issues	Governance Issues
Climate change and carbon emissions	Customer satisfaction	Board composition
Air and water pollution	Data protection and privacy	Audit committee structure
Biodiversity	Gender and diversity	Bribery and corruption
Deforestation	Employee engagement	Executive compensation
Energy efficiency	Community relations	Lobbying
Waste management	Human rights	Political contributions
Water scarcity	Labor standards	Whistleblower schemes

Source: CFA Institute (2015)

The attention to ESG issues in evaluating innovative forms of investment is a phenomenon that has been around for a while. Investors have long considered such issues in fundamental investment analysis by assessing regulatory developments and reputational risk[4]. The early use was mainly controlled by investors motivated by ethical and social matters, while others viewed the ESG issues with skepticism[5]. As reported in a survey carried out by BNP Paribas Securities, 66% of the sample complained about the lack of reliable ESG data, identifying it as the critical obstacle to the broader adoption of ESG issues in investment portfolios[6]. Despite the pitfalls mentioned earlier, the Bank of England governor Mark Carney showed interest in the potential of ESG data as a valuable tool for developing a more robust financial system. Mr. Carney, at a sustainable finance conference organized by the European Commission, stated that "In the future, climate and ESG considerations will likely be at the heart of mainstream investing." Moreover, he pointed out that an improvement in the collection of ESG data better assesses businesses with more excellent earnings stability and lower share price volatility[7].

The idea behind including sustainable factors in investment choices is primarily motivated by personal considerations that go beyond conventional financial metrics. However, including

[3] Barclays, 2016
[4] CFA Institute, 2015
[5] Barclays, 2016
[6] Carney, 2019
[7] Carney, 2019

ESG-related factors in the investment process has frequently resulted in considerable misunderstandings. Environmental, social, and governance factors are commonly used as blanket terms to describe sustainable investments. Although providing an acronym linked to the broad concept of sustainable investments is essential, several terms specify multiple and complex sustainable investment approaches. A comprehensive and relatively exhaustive list of categories of investments in the sustainable sphere is provided below.

1. ***Responsible Investing (RI)****:* it delineates investment decisions focused on financial performance and achieving beneficial social impacts while averting unfavorable ones. This method uses the strict filter of the ESG pillars to examine the investing process while focusing on long-term financial returns and a robust social and environmental system[8].

2. ***Socially Responsible Investment (SRI)***: it is the practice to make investments that have the nature of the business a firm conducts as a focal point. These investments can be made directly to individual companies with strong social values or indirectly through mutual funds or exchange-traded funds (ETF). The widely recognized investment method in this field is based on negative screening, which consists in eschewing companies engaged in ventures retained undesirable by the investors (i.e., producing or selling addictive substances or activities such as alcohol, gambling, and tobacco) in favor of investing in businesses that are involved in projects regarding social justice, environmental sustainability, and alternative energy/clean technology[9].

3. ***Sustainable Investing (SI)***: it is an investing philosophy aiming to preserve the value over the medium and long-run (at least 5 years). Indeed, this strategy focuses the evaluation of investment not only on financial and economic factors but also adds to the matrix how companies strive to impact the world positively. Therefore, it integrates into the fundamental analysis of ESG matters to obtain better returns for investors. Nowadays, sustainable investing and ESG investing are frequently used interchangeably[10].

[8] Eurosif Report, 2021
[9] Chen, 2022
[10] HSBC UK

4. ***Ethical Investing***: it refers to the approach of using a moral principle as the principal screening filter for selecting investments. These investments depend upon the investor's perspective and do not guarantee performance. Ethical investors usually avoid investing in sin stocks, which are firms engaged in stigmatized activities (e.g., firearms, gambling, alcohol, or smoking). Furthermore, this method of investing is based on an accurate review of whether the firm's actions align with its commitment to ethical matters and its historical, current, and projected performance[11].

5. ***Impact investing***: The term "impact investing" was used for the first time in 2007 by the Rockefeller Foundation[12]. It consists in an investment methodology that seeks to generate financial returns while creating a beneficial social or environmental impact. This typology of investments takes the form of several asset classes. Investors who embrace this investment strategy consider a firm's commitment to corporate social responsibility or the dedication to impact society as a whole positively. According to the survey carried out by the Global Impact Investing Network, more than 88% of the respondents affirmed that their investments met or exceeded the expectations[13].

6. ***Mission Investing***: it is a topic closely related to impact investing; in particular, this type of investment is related to investing activities linked to charitable foundations or religious funds that have to a certain extent, specific social, environmental, or spiritual purposes. Mission investments are planned to impact designed philanthropic objectives (i.e., criminal justice, health, education, and public finance). These investments are expected to produce a positive social impact while generating a financial return to contribute to the institution's financial stability[14].

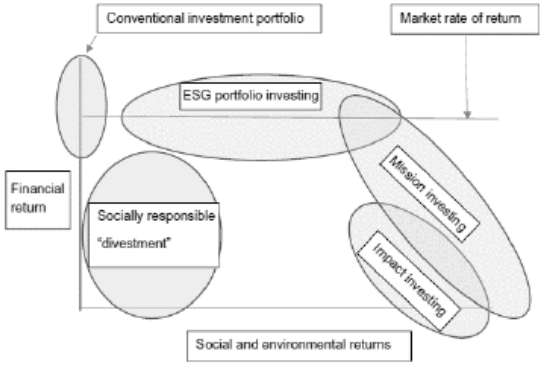
To better understand the several social investment opportunities, the table below provides a graphical summary: it evaluates these approaches concerning financial return on the vertical axis and social and environmental returns on the horizontal axis. Conventional investment portfolios generally have a profit distribution centered around the market's median rate of return but a social and environmental return that is essentially insignificant. However, it is conceivable to create a portfolio that considers ESG factors and could produce financial returns

[11] Kenton, 2022
[12] Hill, 2020
[13] James, 2022
[14] Hill, 2020

that are substantially identical to those of a traditional one. As long as a divestment portfolio is concerned, the performance of financial return combined with social and environmental yields tends to show poor results, with rare exceptions. Impact investing, and mission investment have demonstrated that they are linearly related and frequently overlap. Mission investing generates a rate of return adequate to support the continuing operation of the organizational structure. Instead, impact investing repeatedly involves businesses willing to accept yields below the market average as long as the environmental and social return is significant.

In conclusion, various labels are used to indicate investments that account for ESG matters. However, there is a multitude of factors that separate one sort of investment from another[15].

Table 2. Financial Returns Compared to Social and Environmental Issues for Different Investments Styles



Source: Hill (2020)

1.2. Sustainable and Responsible Investment

Sustainable and Responsible Investment (SRI) is an investment approach that considers environmental, social, and governance factors to achieve long-term competitive financial returns and beneficial social impacts[16]. According to the European Sustainable Investment Forum (Eurosif), several different methods classify the inclusion of ESG factors in the securities' screening process. Essentially, Eurosif has identified seven categories: i) exclusion of holdings from the investment universe, ii) norm-based screening, iii) best-in-class investment selection, iv) sustainability-themed investment, v) ESG integration, vi) engagement and voting on sustainability matters, and vii) impact investing. To better capture, the

[15] Hill, 2020
[16] US SIF

methodologies employed by Eurosif, a comparison with the classification adopted in other countries are reported in Table 3.

Table 3. Growth of Sustainability-Themed Investments by Country

Eurosif	GSIA-equivalent	PRI-equivalent	EFAMA-equivalent
Exclusion of holdings from investment universe	Negative/ exclusionary screening	Negative/ exclusionary screening	Negative screening or Exclusion
Norms-based screening	Norms-based screening	Norms-based screening	Norms based approach (type of screening)
Best-in-Class investment selection	Positive/ best-in-class screening	Positive/ best-in-class screening	Best-in-Class policy (type of screening)
Sustainability themed investment	Sustainability-themed investing	Sustainability themed investing	Thematic investment (type of screening)
ESG integration	ESG integration	Integration of ESG issues	-
Engagement and voting on sustainability matters	Corporate engagement and shareholder action	Active ownership and engagement (three types): Active ownership Engagement (Proxy) voting and shareholder resolutions	Engagement (voting)
Impact investing	Impact/community investing	-	-

Source: Eurosif (2016)

As Table 3 portrays, despite some variations, the approaches used in many countries are generally consistent with Eurosif's position[17]. Furthermore, it is essential to emphasize that these approaches can be used independently and in various increasing combinations.
According to the study conducted by Eurosif, European practitioners use extra-financial evaluation in their portfolios. Still, these results are insufficient to qualify as SRI or meet a particular strategy's standards.
As stated afore, the different SRI methods are not mutually exclusive; therefore, the fact that there are no predetermined guidelines defining what constitutes an SRI product leaves plenty of room to develop goods that address particular customer demands, national legal standards, or particular themes or trends[18].
As demonstrated in Table 4, throughout 2015-2017, the European economy showed an increase in most of the Sustainable and Responsible Investments (SRI) strategies. In particular, it indicates that SRI became essential to European fund management, with practitioners having an additional tool to evaluate their investment strategies better. Over the analyzed period, ESG integration represented by far the preferred method, growing at a CAGR 2015-2017 of 27%, resulting in over 4 trillion euros of assets under management. Engagement and voting gained relevance, increasing at a CAGR 2015-2017 of 7%, highlighting the renewed link between the

[17] Eurosif, 2016
[18] Eurosif, 2016

investors and the companies in their portfolios. This positive commitment translates into a reduction in appetite for more dogmatic approaches. Although the slightly decreasing trend (CAGR 2015-2017 -3%) is portrayed, Exclusion remains a dominant strategy with over €9.4 trillion in terms of assets. The most common exclusion criterion is tobacco, which experienced a wave of divestiture that has involved European and non-European major asset owners over the 2015-2017 period. For what concerns Impact Investing, in the timeframe 2015-2017, reported a CAGR of 5% - but it registered a 6-year CAGR of 52% - reaching €108 billion of assets under management in 2017. According to Eurosif, this strategy will face an upward trend in the following year as it increasingly aligns with the Sustainable Development Goals (SDGs)[19].

Table 4. Evolution of SRI Strategies in Europe

Source: Eurosif (2018)

1.2.1. Best-in-Class

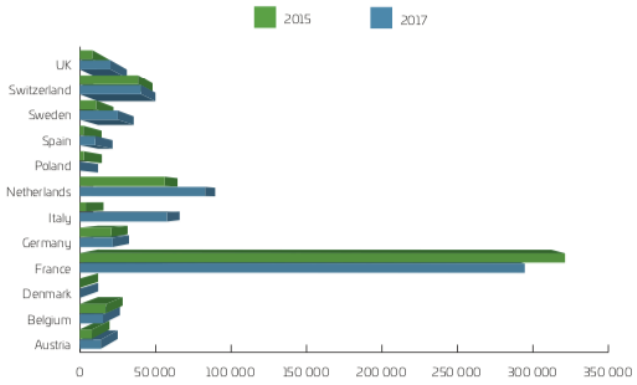
The Best-in-Class strategy aims to screen whether companies or countries that issue securities comply with environmental, social, and governance standards. Therefore, investors tend to select companies that report the best ESG score in a specific industrial sector. In practice, investors pick the criterion, and the ultimate score depends on how the factors are weighted, which varies across industries. A Best-in-Class portfolio is typically composed of companies that satisfy both an ESG and a financial evaluation; other similar methodologies are Best-in-universe and Best-effort[20]. Using the Best-in-Class approach resulted in exploiting

[19] Eurosif, 2018
[20] Eurosif, 2018

several benefits since it incorporates all the sustainability factors into the investment decision-making process in addition to the economic aspects. Additionally, this strategy covers all sectors, in contrast to the exclusion method, encouraging competition among them and facilitating the adoption of sustainability concerns[21].

From 2009 to 2017, Best-in-Class portrayed an increase at a CAGR of 20% and reached over €585 billion of assets under management. According to Eurosif, at the end of 2015, all the European countries, except for Sweden, registered a positive trend in favor of this approach. At the end of 2017, as represented in Table 5, the situation changed with a contraction in three countries: Belgium, Poland, and France. Although the outcome depicts two different conditions, in the former two countries, this strategy seems to be unproductive. In contrast, in the latter one, despite an 8% decrease, the Best-in-Class approach confirms to be practiced. For what concerns Italy, the Best-in-Class strategy grew from €4 billion in 2015 to €58 billion in 2017. This represents a clear sign that investors in Italy are becoming more conscious in the evaluation of ESG factors and that are not satisfied with a simple exclusion approach. The Netherlands represents another country where the Best-in-Class strategy portrayed a positive trend with a growth of 47% and a total AuM of €83 billion[22].

Table 5. Best-in-Class Investments by Country



Source: Eurosif (2018)

1.2.2. Sustainability Themed

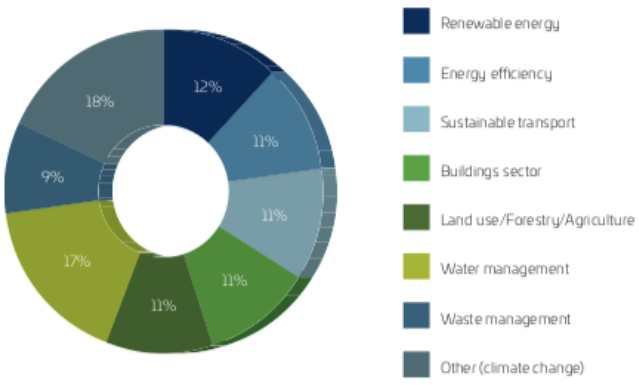
This approach allows the selection of assets that are strictly linked to sustainability matters into single- or multi-themed funds. The constantly evolving themes allow measuring the investors' consideration towards certain areas of sustainability. Furthermore, it is essential

[21] Staub-Bisang, 2012
[22] Eurosif, 2018

to underline how the investors' preferences shifted towards specific themes such as climate and water-theme funds in the recent past. The increasing focus that international institutions are placing on sustainability and climate change issues have sparked an increase in the usage of this approach. In particular, between 2009 and 2017, the Sustainability Themed strategy in Europe grew at a CAGR of 25%. This increase was not evenly distributed since the most significant increase observed in France halved by 2017, reaching €20 billion. Similarly, the Netherlands experienced a decrease of 81% with a total asset under management of €7 billion. In 2017, the countries that portrayed this strategy's most vital positive trends were Belgium, Spain, and Italy (AuM of €53 billion).

In 2017, 17% of the themed investments were linked to water management: water shortage represents a threat impacting the lives of 1.2 billion people worldwide. According to themed investors, renewable energy (with 12% of investments) is the second concern. At a level of 11% of investment there are several themes: energy efficiency, sustainable transport, building transport, land use/forestry/agriculture, and waste management[23]. Table 6 summarizes the different themes' trends.

Table 6. Sustainability Themed Investments



Source: Eurosif (2018)

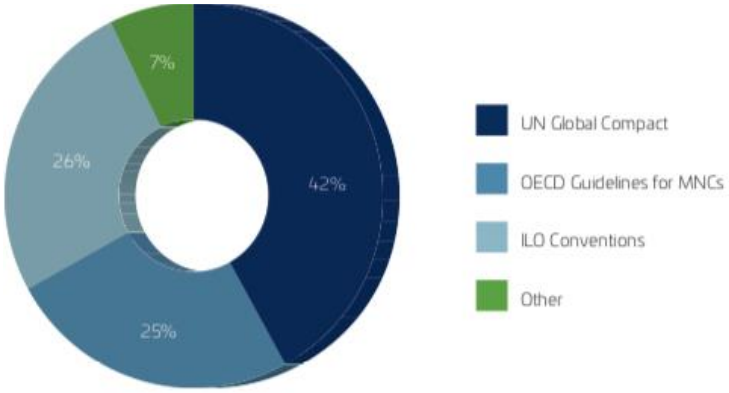
1.2.3. Norms-Based Screening

Norms-Based Screening enables investors to evaluate whether the companies in their portfolios are pursuing the desired level of compliance with international standards and norms. The Norms mentioned above are laid out as international initiatives and guidelines - i.e., OECD Guidelines for Multinational Enterprises, the ILO Tripartite Declaration of Principles

[23] Eurosif, 2018

concerning Multinational Enterprises and Social Policy, the UN Global Compact, and the Guiding Principles on Business and Human Rights - and focus on issues including labor standards, environmental protection, human rights, and anti-corruption principles. The Norms-Based Screening strategy can be applied independently or in combination with other approaches, mainly engagement and/or exclusion. In 2015-2017, Norms-Based Screening underwent a drop of 38%, mainly caused by the registered decline in the use of the Exclusion strategy. According to Eurosif, in 2017, the UN Global Compact was the preferred Norm (42%), while OECD Guidelines and ILO Conventions accounted for 26% and 25%, respectively. However, 7% of the participants in the study indicated their preference towards another norm or guideline[24]. Table 7 portrays the afore-described trends:

Table 7. Application of Norms as part of Norms-Based Screening in Europe



Source: Eurosif (2018)

1.2.4. ESG Integration

The core objective of this strategy is to reduce the opportunity costs associated with ESG risks (i.e., reputational risks). ESG screening is a simple approach to include sustainability considerations in investments, but there are some drawbacks. This approach is seen as a broad proxy for the SRI industry, which can lead to information asymmetry for investors because it oversimplifies a sector that has enhanced its complexity and sophistication over time. For the aforementioned reason and the fuzzy boundaries linked to the integration of ESG factors, it is still challenging to state whether two strategies that belong to the same category might be comparable. As a matter of fact, it is almost unachievable to ensure a comparative analysis that guarantees that ESG integration is consistently applied in the same way across investors and

[24] Eurosif, 2018

investments[25]. Unlike the Best-in-Class approach, ESG integration does not require peer group benchmarking.

Nevertheless, they share the property of not having ex-ante requirements for inclusion or exclusion[26]. Furthermore, the no-compromise strategy from a financial point of view illustrates another distinction between positive screening approaches (i.e., Thematic Investments and Best-in-Class) and negative screening, such as Exclusion. Investors merely need to choose securities that adhere to sustainability standards to step into the sustainable investment universe. Therefore, investors may not necessarily need to change or modify their investment objectives to optimize risk-adjusted return. As a matter of fact, ESG factors are primarily integrated into the investment decision-making process for risk management purposes by managing potential future risks and associated opportunity costs; hence the factors are only considered if they have a beneficial impact on financial performance[27].

The valuation of a mining business is an example better to comprehend the functioning of the ESG integration strategy. The valuation process of a stock in the mining sector starts by looking at how the considered company is tackling ESG issues. In particular, analysts carry out environmental and social impact assessment and closure planning to determine the effectiveness of the procedure used by mining firms to examine the environmental and social effects of a mine during its life and beyond. The evaluation uses several indicators, including ISO 14001, for what concerns environmental responsibilities and the lost production time due to labor injury frequency concerning health and safety. Along these lines, analysts pay close attention to local economies, government relations, and community involvement. Analysts consider ESG risks as part of the framework so that they can appropriately adjust the discount rate for mining businesses. As a matter of fact, a company's discount rate can be reduced if it implements ESG policies, which increases the projected intrinsic value of the business[28].

1.2.5. Engagement and Voting

In 2017, Engagement and Voting reached more than €4.8 trillion of assets under management, registering a positive trend (CAGR 14%) from 2009-2017. This data confirmed the Engagement and Voting strategy as the second most popular approach after the Exclusion

[25] Eurosif, 2018
[26] CFA Institute, 2015
[27] Staub-Bisang, 2012
[28] CFA Institute, 2015

one[29]. This strategy seeks to produce a practical impact on corporate management. In particular, it is closely related to the concept of fiduciary duty since it is based on the relationship between the shareholders and their accountability towards the beneficiaries[30]. The core concept behind this strategy resides in the possibility that shareholders have to choose the preferred stocks in their portfolios. Still, at the same time, they must actively monitor the company in which they have invested, leading it to better company management and more sustainable business models[31].

The Engagement and Voting strategy has both pros and cons. The advantages are linked to the shareholder's ability to raise awareness towards a more sustainable development encouraging the corporate's management to operate according to the ESG criteria. On the other hand, the disadvantage is related to the low impact on returns in the short-run but positive impacts in the long-run. Furthermore, this practice could be costly, time-consuming, and successful only if shareholders actively comply with their duties[32].

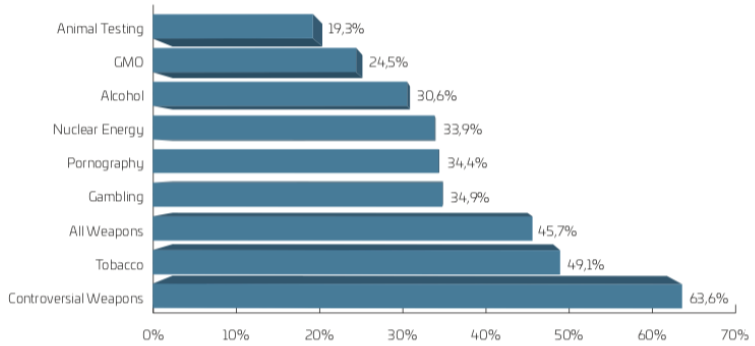
1.2.6. Exclusion

The Exclusion approach is considered the oldest among the seven SRI strategies since its first use dates back to the early 18th century. This strategy systematically eliminates corporations, industries, or nations from the eligible investment universe if they are engaged in particular activities according to predetermined criteria (i.e., weapons, pornography, tobacco, and animal testing). This approach can be employed across the whole product range of assets, whether at the level of a specific fund or mandate or, increasingly, at the level of an asset manager or asset owner[33]. Indeed, investors use this method as a risk management tool.

As Table 8 portrays, the weapon industry represents the most relevant exclusion field in evaluating investment opportunities at the European level. Furthermore, almost 50% of the sample indicated tobacco as one of the industries most subjected to the exclusion strategy. This highlights how investors seriously examine the social and health consequences of the tobacco industry, understanding that such an industry does not constitute a long-term investment. Table 8 summarizes the industries most subjected to the exclusion approach in Europe:

[29] Eurosif, 2018
[30] Eurosif, 2016
[31] Eurosif, 2018
[32] Staub-Bisang, 2012
[33] Eurosif, 2018

Table 8. Top Exclusions Criteria in Europe



Source: Eurosif (2018)

As displayed in Table 8, the top exclusion areas are represented by controversial weapons and tobacco. Still, the study reports other industries such as gambling, pornography, nuclear energy, alcohol, GMO, and animal testing that represent other exclusion criteria.

According to Eurosif, the use of this wildly accepted strategy does not represent by itself a true SRI since for every investor willing to divest from a segment of the market; there will be a buyer, ensuring no harm will occur to the investee company. Therefore, to be effective, an exclusion strategy must be used in conjunction with some attempt at engagement and voting. This mix of strategies allows investors to hold a portfolio of stocks of companies operating in sectors that do not represent a threat; hence, they can actively exercise their ownership and commitment to impact the company positively[34].

To summarize, the exclusion approach is a pillar for incorporating ethical preferences into the investment evaluation process. Moreover, this approach allows institutional investors whose aim is represented by total transparency to create a clean portfolio. However, from a risk and return perspective, the restrictions linked to this strategy might have a negative impact[35].

1.2.7. Impact Investing

The core of the Impact Investing strategy is represented by the combination of a positive impact linked with the commitment to return. Between 2015 and 2017, this strategy grew at a CAGR of 52%, and it gained consensus mainly among first-time SRI investors. Three

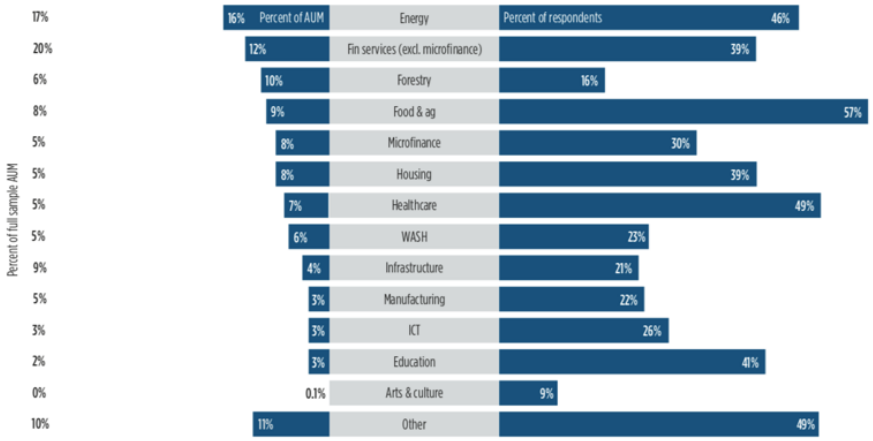
[34] Eurosif, 2018
[35] Staub-Bisang, 2012

requirements could provide a general summary of the necessary conditions for an investment to be qualified as impact one:

- **Intentionality**: the intention of a shareholder to produce a discernable and positive social and environmental impact;
- **Additionality**: achievement of a positive impact beyond the provision of private capital;
- **Measurement**: define transparently the financial, social, and environmental performance of investments[36].

In 2020, according to a study conducted by the Global Impact Investing Network (GIIN), the asset under management linked to the Impact Investing strategy reached 715 billion US dollars. The investments are spread across several markets: Eastern Europe and Central Asia, East Asia and the Pacific, South Asia, Latin America and the Caribbean, sub-Saharan Africa, the Middle East, and North Africa. Furthermore, following the study pursued by GIIN, the capital allocation varies across several sectors: energy represents the category with a more significant percentage of AuM (16%), excluding outlier respondents. Table 9 portrays the areas in which investors mainly allocate their capital[37]:

Table 9. Capital Allocation of Impact Investing by Sector



Source: GIIN (2020), Annual Impact Investor Survey

In the field of Impact Investing, the investments range in size from microfinance to millions of dollars, and the capital is frequently allocated without any prospect of a financial return[38]. Although financial performance does not represent a determining factor for impact investors,

[36] Eurosif, 2018
[37] GIIN Research Team, 2020
[38] Hill, 2020

returns across various approaches and asset classes achieve performance levels equivalent to traditional investments. Significantly, the top quartile funds pursue market returns at levels comparable to those of conventional markets, and in many cases, the median performance is also quite similar[39].

As mentioned above, investors can combine strategies to meet their objectives and fix sustainability criteria while maximizing their returns and minimizing risks. The degree to which these objectives are generally met mainly depends on the financial investment targets and non-financial/ethical factors taken into account by each investor. A good combination of the several approaches might include:

- The practice of using negative screening to filter out industries that violate environmental, social, and ethical standards;
- The integration of ESG factors with the scope of minimizing opportunity costs linked to ESG risks;
- The sustainable theme takes into account social and environmental development while diversifying assets and increasing possible returns on portfolios;
- The engagement and voting to influence the management of the company[40].

1.3. UN PRI: The Principles for Responsible Investments

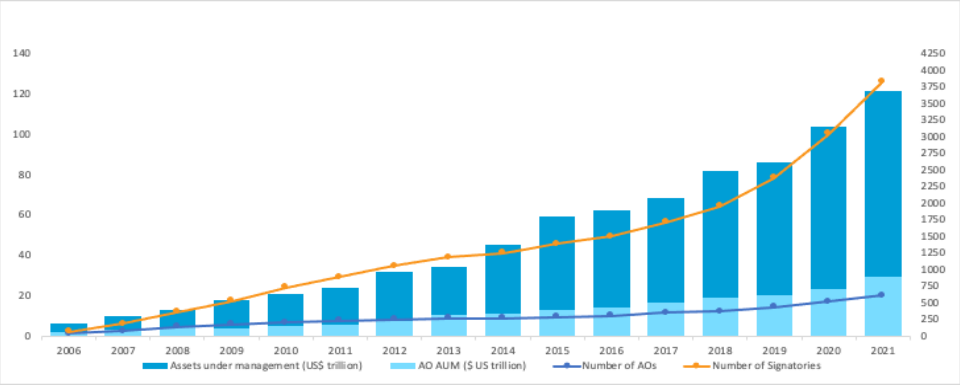
Under the direction of the United Nations (UN), an international group of institutional investors created the independent non-profit organization known as the Principles for Responsible Investing (PRI). The PRI acts with a long-term perspective in the interests of i) its signatory investors, ii) the financial markets and economies in which they operate, and iii) the environment and society. The organization's goals are to encourage investors to use responsible investments to increase returns and enhance risk management. Therefore, it operates through two channels:

- Understanding the investment implications of Environmental, Social, and Governance factors;
- Supporting its network of investors in incorporating these factors into their investment and ownership decision-making process.

[39] Mudaliar & Bass, 2017
[40] Staub-Bisang, 2012

To provide a list of procedures for incorporating environmental, social, and governance issues into investment practices, the international network of investors has developed a set of six principles for responsible investment. Since its foundation in 2006, UN PRI has attracted an increasing number of investors and AuM. In 2021, it registered more than 3750 signatories and more than 120 trillion US dollars in assets under management. Table 10 summarizes the evolution of the UN PRI from 2006 to 2021[41]:

Table 10. PRI Growth 2006-2021



Source: PRI (2021)

Over the next ten years, UN PRI's goal is to gather the greatest possible number of responsible investors to work towards developing sustainable markets that contribute to a more prosperous world. The objective as mentioned above finds its roots in the mission of the organization[42]:

"We believe that an economically efficient, sustainable global financial system is necessary for long-term value creation. Such a system will reward long-term, responsible investment and benefit the environment and society as a whole" (UN PRI, 2017)

UN PRI will strive to effectively achieve the above-mentioned sustainable financial system through a series of actions, such as the adoption of the six principles, the promotion of good governance, integrity, and accountability, and the addressing of barriers related to market practices, structures and regulation for a sustainable financial system[43].
To follow the six principles of UN PRI laid out by the network of international investors[44]:

[41] UN PRI, 2021
[42] UN PRI, 2017
[43] UN PRI, 2016
[44] UN PRI, 2017

1. Incorporate ESG issues into investment analysis and decision-making process.
2. Be active owners and incorporate ESG issues into ownership policies and practices.
3. Seek appropriate disclosure on ESG issues by the entities in which the investors invest.
4. Promote acceptance and implementation of the principles within the investment industry.
5. Work together to enhance effectiveness in implementing the principles.
6. Report on the activities and progress that each investor carries out intending to implement the principles.

Thanks to the introduction of the six Principles, UN PRI was able to develop a first three-year strategy between 2015 and 2018 and a second one between 2018 and 2021. Specifically, the former focuses on several themes to turn awareness into effectiveness, culminating in 2016 with the release of the Blueprint for responsible investment. A series of actions were conducted within the three-year strategy's commitment period, with the following highlights serving as their culmination[45]:

1. Support the network of investors in the implementation of the principles: UN PRI provides guides, case studies, webinars, and events to teach the signatories how to implement the principles in the investment process across different asset classes, i.e., listed equity, fixed income, private equity, and real estate.
2. Provide opportunities for investors to convene, share knowledge and collaborate: UN PRI cooperates with signatories to discover and highlight crucial environmental, social, and governance matters in the market and coordinates collaborative initiatives to solve them.
3. Engage and facilitate dialogue with critical decision-makers: UN PRI supplies tools and insights to international policymakers and standard setters aiming to develop a regulatory and investment environment consistent with the six principles.
4. Facilitate collaboration between academics and investors and use PRI's knowledge to educate signatories and stakeholders: the organization gathers investment practitioners with academics to collaborate by sponsoring bespoken practitioner-focused research

[45] UN PRI, 2016

and providing the best insights from existing academic studies to the network of investors.

5. Enhance signatory accountability mechanisms: the UN PRI reporting framework guarantees accountability for the PRI and its network of international investors.
6. Strengthen the PRI voice and brand: the organization spokespersons frequently provide commentary on topical issues linked to responsible investment in international prints, broadcasts, and social media. Moreover, PRI organizes three year-round events in London, Singapore, and Berlin.
7. Strengthen capacity and expertise in key markets: the PRI signatories are geographic groups of investors working together on responsible investment available in their territory. The organization seeks to extend its presence in Australia, China, Canada, France, and the Benelux.
8. Increase representation and participation of asset owners: UN PRI strives to increase the number of asset owner signatories. Europe represents the region with the highest number of asset owner signatories to the network, followed by North America and Oceania. In contrast, non-corporate pension fund represents the first type of asset owner.
9. Collaborate with key stakeholders to further PRI's mission: to align strategies and activities, the organization collaborates with relevant stakeholders through finance, sustainability, and responsible investments.
10. Deepen and strengthen PRI's relationship with UN partners: PRI is an investor initiative in collaboration with the UNEP Finance Initiative (UNEP FI) and the Global Compact. In particular, the organization worked with the UN on five projects, one of which was the sustainable stock exchange.
11. Initiate the Sustainable Financial System (SFS) program: UN PRI addressed nine significant risks and challenges that could jeopardize a sustainable financial system.

Following the Blueprint for Responsible Investment, it is possible to identify three key areas of influence, which are consistent with the previous initiatives by UN PRI[46].

1. Responsible investors: the organization will aim at strengthening, deepening, and expanding its core work to guide responsible investors in their quest for long-term

[46] UN PRI, 2016

value creation and to improve alignment throughout the investment chain. This field embeds several actions, including:

1.1 Empower asset owners
1.2 Support investors incorporating ESG issues
1.3 Foster a community of active owners
1.4 Showcase leadership and increase accountability
1.5 Convene and educate responsible investors

2. Sustainable market: UN PRI will concentrate on addressing unsustainable market features in which investors operate to achieve the kind of sustainable global financial system that investors demand. This area includes a variety of operations:

2.1. Challenge barriers to a sustainable financial system
2.2. Drive meaningful data throughout markets

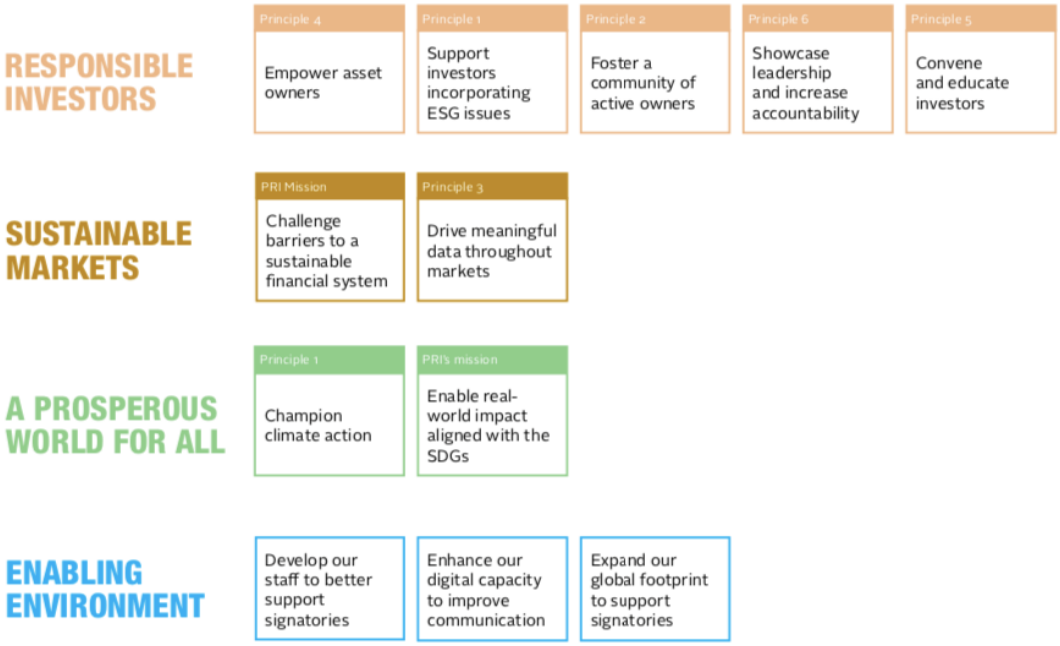
3. A prosperous world for all: the organization will empower networkers to enhance the real world by promoting investments that contribute to inclusive and prosperous societies both in the present and the future. This sphere covers:

3.1. Champion climate action
3.2. Enable real-world impact aligned with the SDGs

Regarding the 2018-2021 strategy, at the core of this one, there are the same themes as the previous one but tackled more in-depth, providing further directions. This strategy is supported by three key enablers: i) educating staff members to support networkers better, ii) increasing UN PRI's digital capabilities to enhance communication, and iii) broadening UN PRI's global presence to support signatory investors[47]. Table 11 portrays the steps and actions that the organization plans to take for this three-year strategy:

[47] UN PRI, 2017

Table 11. 2018-2021 Strategy at a Glance



Source: UN PRI (2017)

The core objective in the field of responsible investors is to enable them to pursue long-term value creation and improve alignment throughout the entire investment chain. The first step displayed in Table 11 – empower asset owner- represents a focal point of the framework; since asset owners have a vast pool of money, they can determine the market's course. To fulfill their obligation towards the beneficiaries, asset owners will need a robust strategy to assess the impact of their investments on the real economy and the society in which the beneficiaries reside[48]. Table 12 depicts how, if the asset owners' commitment towards responsible investment increases, then as a consequence, responsible investments rise in value throughout the whole investment chain. Investment managers and consultants need to be prepared to recognize these signals and expand their ESG-related offerings. As a result, sustainability is already incorporated into the investment chain. Currently, the only responsibility of policymakers is to support the chain with regulatory policies to strengthen responsible investment practices[49].

[48] UN PRI, 2017
[49] UN PRI, 2017

Table 12. The Influence of Asset Owners on the Investment Chain

Source: UN PRI, 2016

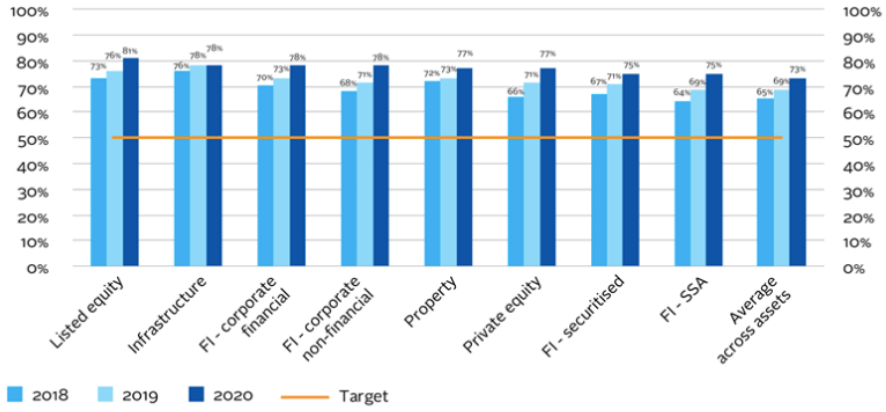
The first step of the 2018-2021 strategy is articulated in eight different actions that capture the essence of this stage of the framework[50]:

1. To supply advanced guidance, including trustee training, to support beneficiary-aligned outcomes.
2. To create a dedicated asset owner online resource hub.
3. To support global and regional knowledge-sharing groups for AO.
4. To understand megatrends to educate asset owners on asset allocation better.
5. To empower AO interaction with investment managers.
6. To create an asset owners trustee network.
7. To enable AO to communicate with investment managers about proxy voting.
8. To assist asset owners in implementing Task Force for Climate-related Financial Disclosure (TCFD) recommendations.

According to UN PRI, in 2020, the organization experienced an increase in the number of asset owners reporting to the PRI's network, including those subscribing to the network for the first time and those whose knowledge of responsible investment practices has not reached high levels. Table 13 summarizes the evolution of different categories of asset owners:

[50] UN PRI, 2017

Table 13. Percentage of Asset Owners Considering Responsible Investment and ESG in Contract between 2018 and 2020



Source: UN PRI, Annual Report, 2020

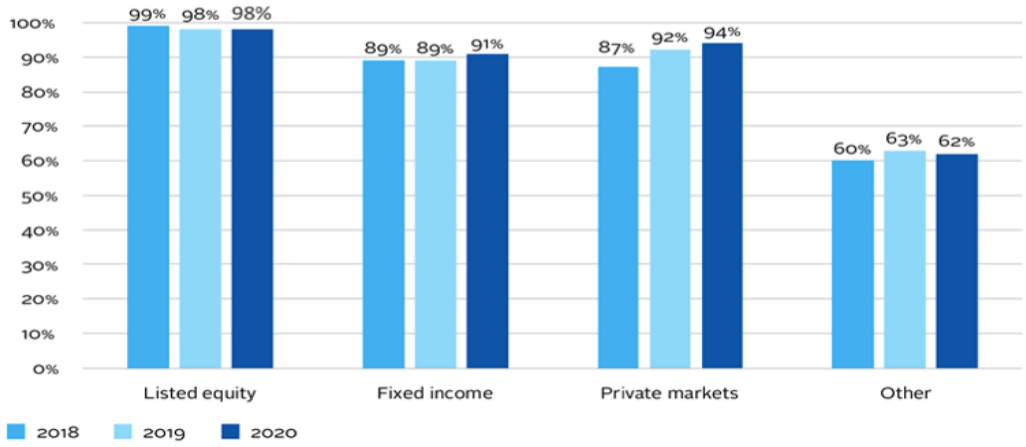
The second stage of the 2018-2021 strategy framework - support investors incorporating ESG issues- focuses on expanding ESG integration[51]. The core of this step is represented by three actions[52]:

1. To create new and update existing ESG integration resources by asset category.
2. To exercise thought leadership in areas where there is a lack of ESG inclusion.
3. To introduce tools and training geared toward the mainstream investing market in collaboration with other institutions, i.e., the CFA Institute.

In 2020, as reported in the UN PRI's annual report, 98% of the investment managers and asset owners belonging to the network acknowledged that they included ESG factors as an investment criterion for listed equity investments, compared to 91% and 94% for fixed income and private markets, respectively. Table 14 portrays the positive trend that occurred in these asset classes between 2018 and 2020 while reporting a minor reduction of 1% faced by other asset classes in 2020:

[51] UN PRI, 2017
[52] UN PRI, 2017

Table 14. ESG Incorporation across all asset categories



Source: UN PRI, Annual Report, 2020

Fostering a community of active owners represents the third phase of the strategy, which has a central objective of enhancing the quality of active ownership. Indeed, shareholders not actively involved in the company face the risk of owning poorly managed companies that rarely perform well over the long run and frequently disregard the interests of beneficiaries[53]. In these circumstances, the core actions that the 2018-2020 strategy has introduced are the following[54]:

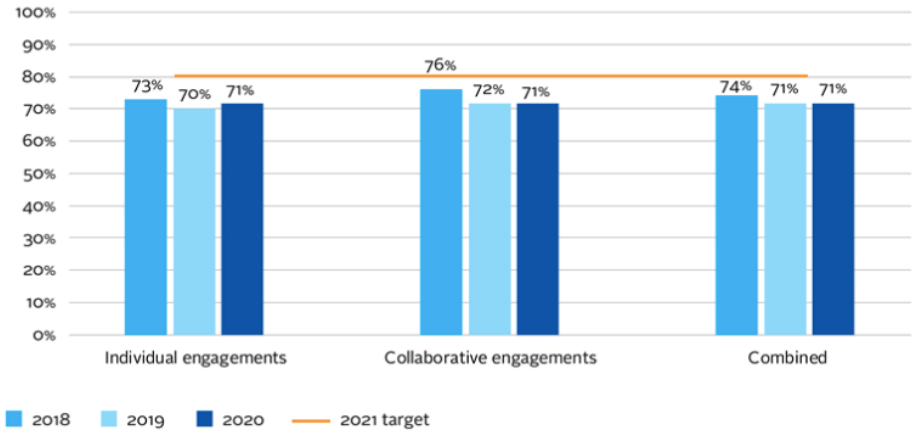
1. To provide greater guidance and insights on Principle 2.
2. To grow engagement practices across asset categories.
3. To supply guidance on proxy voting conforming with RI policies.
4. To advise on enhancing the voting chain.
5. To develop an improved collaboration platform.

The organization identifies two types of engagement: collaborative and individual. The former occurs when institutional investors engage in a dialogue with companies about ESG matters. The latter happens when a person interacts with businesses on a personal level[55]. Nevertheless, as indicated in Table 15, just over 70% of asset owners and investment

[53] UN PRI, 2016
[54] UN PRI, 2017
[55] UN PRI, 2013

managers belonging to the network have an active ownership policy and have implemented 32 organizational measures to efficiently implement that policy in their listed shareholdings[56].

Table 15. Networkers Setting Objectives on the Majority of their Engagements



Source: UN PRI, Annual Report, 2020

The fourth step focuses on showcasing leadership and enhancing accountability. Its strategic objectives include highlighting best practices and implementing innovative accountability frameworks. This stage concerns many operations[57]:

1. To create standards for leadership and best practice sharing;
2. To establish an award program to recognize the finest practices for each industry;
3. To develop watch lists, set minimal requirements, and support networkers who do not meet the criteria;
4. To delist networkers who do not achieve the required standards after two-year;
5. To align the reporting framework with international standards;
6. To review the reporting framework to enhance the quality of reported data.

The strategy's last stage of the responsible investors' section is represented by convening and educating investors. This step relies on the following core points[58]:

[56] UN PRI, 2020
[57] UN PRI, 2017
[58] UN PRI, 2017

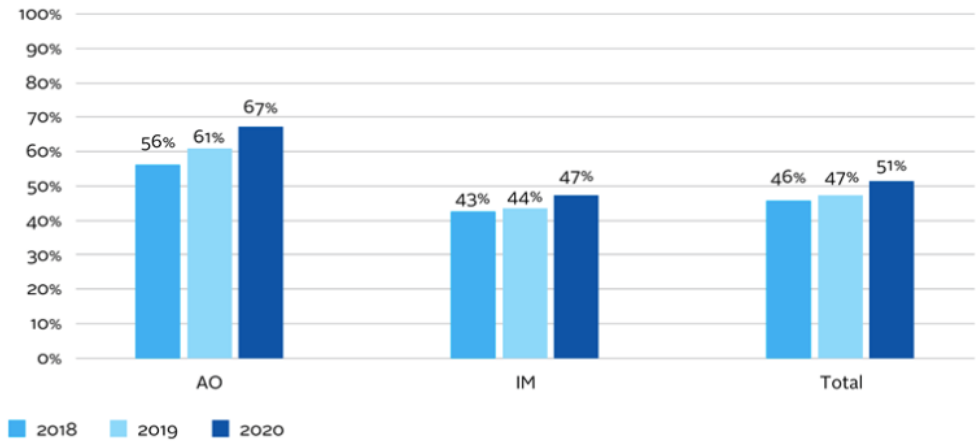
1. To raise the presence in markets where RI is under-represented, especially in Asia and the USA;
2. To introduce a Membership category for Associates;
3. To create a detailed trustee education program;
4. To train practitioners online through the PRI Academy;
5. To encourage academic and investor collaboration to enhance investment theory.

Sustainable markets are the second sphere of interest of the UN PRI 2017-2020 strategy. In this regard, there are primarily two steps to consider: the first is to challenge barriers to a sustainable financial system, whose objective is to align the financial system over time, and the second is to promote meaningful data throughout the markets in order to improve sustainability reporting[59].

The major tasks covered by the first stage concern: i) building awareness of the purpose of a sustainable financial system, ii) determining how to better align interests along the investment chain, and iii) working with expert reference groups to align policies with sustainable financial systems[60]. In particular, the UN PRI's efforts to establish a more sustainable financial system involve support for these reference groups, which includes partnerships between investors and policymakers[61]. In 2020, over 51% of the networker investors claimed to be engaged with poly makers, compared to 46% in 2018. Table 16 summarizes the development of the total number of signatory investors between 2018 and 2020[62].

[59] UN PRI, 2017
[60] UN PRI, 2017
[61] UN PRI, 2019
[62] UN PRI, 2020

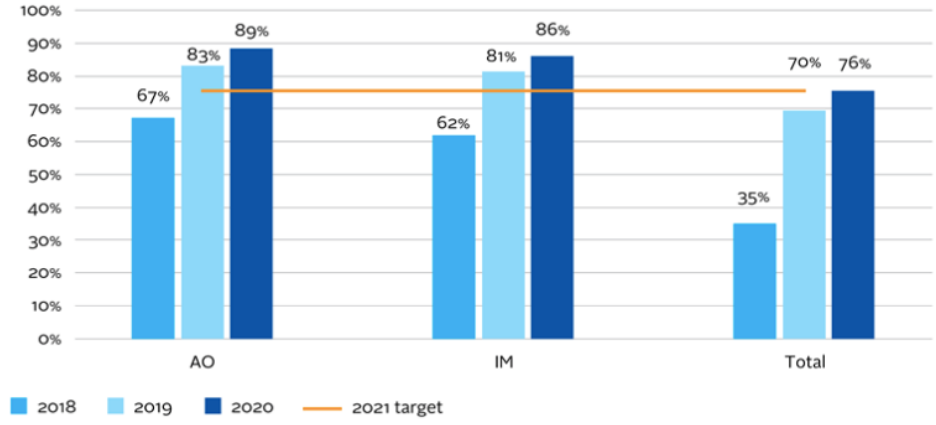
Table 16. Networkers Engaging with Policy Makers between 2018-2020



Source: UN PRI, Annual Report, 2020

On the other side, the second phase includes the following operations: i) integrate additional transparency and accountability through the reporting platform, ii) enhance the Sustainable Stock Exchanges initiative and increase the stock exchanges' involvement in responsible investment, iii) encourage listing regulations that require ESG factors and assessment in corporate reporting, and iv) promote the consolidation of reporting frameworks[63]. As stated in the PRI's 2020 Annual Report, 76% of the network signatories utilized the data portal in 2020, a significant increase of 41% from the value reported in 2018, as it is depicted in Table 17[64]:

Table 17. Data Portal Usage Among Networkers between 2018-2020



Source: PRI, Annual Report, 2020

[63] UN PRI, 2017
[64] UN PRI, 2020

The third sphere of interest of the 2017-2020 strategy concerns a well-developed concept that has a flourishing world for society as a whole as its core objective. At this point, the two most important measures are promoting climate change and enabling real-world effects that are in line with SGDs. Although the two steps have remained unchanged from the previous strategy, some actions have been integrated while others have been implemented. The first measure, which primarily aims at ensuring the commitment to climate change and promoting the low-carbon transition, covers the following interventions: i) educating shareholders on portfolio transition to a low-carbon economy, ii) promoting the availability of green investment opportunities, iii) enhancing climate reporting by supporting the TCFD guidelines, and iv) announcing the 2020 agenda. On the other side, the second measure, which seeks to develop an investment case for SDGs, includes the following actions: i) assisting networkers in integrating the SDGs into the investor decision-making process, ii) developing tools to assist investors in integrating the SDGs in the selection of managers, and iii) providing to the government's feedbacks from investors on their national SDG plan.

Furthermore, UN PRI developed a third strategy grounded on the six principles that will cover the following three years (2021-2024). The COVID-19 pandemic, environmental issues, and widening socioeconomic disparities are among the several related problems that have emerged since the launch of this third strategy. Responsible investment has become more widely accepted despite the economic downturn, and investors' engagement with ESG issues has advanced significantly. The core topics of the 2021-2024 strategy continue to be the ESG incorporation and the stewardship. PRI will continue to assist the network signatories with the incorporation of ESG matters and will contribute to setting the environment for ESG incorporation. Increasingly, the networkers recognize that the real-world sustainability outcomes they contribute to shaping through their investing activities will feed back into the financial risks they face. For instance, building a bridge between financial risk, opportunities, and actual outcomes is a critical component of this strategy. The 2021-2024 strategy revolves around the action areas set out in the Blueprint for Responsible Investment and comprises 22 key initiatives under the themes set out in the Blueprint:

- **Responsible Investors**
    1. To provide evidence, tools, guidance, and examples of best practices for assessing financial risks/ opportunities and links to real-world outcomes;
    2. To develop the stewardship attitude and the understanding of investors;

3. To encourage collective cooperation on important ESG topics;
4. To provide dedicated support for asset owners;
5. To boost support for responsible investment in emerging markets;
6. To deliver the updated reporting and evaluation procedure following the pilot;
7. To create a leadership development program that encourages learning and recognizes excellence;
8. To increase the minimum requirements;
9. To enhance the reliability of the data submitted to the PRI by investigating more robust assurance measures;
10. To improve the training for investment professionals through the PRI Academy;
11. To better off the relationship between investors and academics.

- **Sustainable Markets**
    1. To engage with policymakers on climate and other priority matters;
    2. To contribute to the incorporation of ESG being implemented in financial policy and regulation;
    3. To enforce legal and policy analysis to develop the environment and the frameworks necessary to promote investment for real-world outcomes;
    4. To collaborate with other financial market participants to ensure that the products and services are aligned with the sustainability expectations of the investor clients;
    5. To develop, in collaboration with others, a worldwide unified, sustainable reporting system for investors and corporations;
    6. To analyze the structure of the investment market to define sustainability-enhancing interventions for systemically essential participants.

- **A prosperous world for all**
    1. To provide individualized guidance on investing with real-world outcomes across several industries;
    2. To create instruments and guidelines for evaluating climate risk;
    3. To encourage networkers to align their portfolio towards net zero by 2050;

4. To develop investors' understanding of human rights and assist them in incorporating the OECD Guidelines for Multinational Enterprises and the UN Guiding Principles;
5. To support investor action on important ESG matters, incorporating activities that shape outcomes in accordance with planetary boundaries, inclusive communities, and a business culture that produces sustainable performance.

Suppose this strategy turns out to be successful by 2024. In that case, investors will consider in the investment decision-making process how their actions will impact the real economy and the environment in which their beneficiaries live and plan to retire. ESG factors will be incorporated into financial policy and regulations in key markets. In several markets, legal frameworks for impact investing will be enforced. Leading financial systems will align incentives, behaviors, and policies. Investors will commit to a 1.5C pathway and employ international human rights frameworks when making investments in order to reach net zero by 2050. The progress will lead to the development of a global sustainability reporting system for companies and investors[65].

1.4 Reasons why investors should consider ESG Factors

Individuals and investors have become more aware of environmental, social, and governance (ESG) matters regarding the company they invest in[66]. Additionally, over the past 25 years, corporations have increasingly measured and reported environmental, social, and governance data. As a matter of fact, the Global Sustainable Investment Alliance has detected ten common trends that contributed to the rise of this phenomenon[67]:

- ***Good governance is systemically essential***: the 2008 financial crisis highlighted the importance of the variables related to culture and conduct, reinforcing the fundamental role of corporate governance.
- ***Public and private cooperation is expanding***: public-private partnerships have developed to address social and environmental challenges.

[65] UN PRI, 2021
[66] Hill, 2020
[67] Struc, 2017

- ***Climate change is a reality***: climate change is now widely acknowledged. Therefore, several mitigation techniques have been enforced. These include the COP21 Paris Agreement, which aims to limit the increase of global temperatures below two degrees and foster sustainable investment portfolios and more disclosure of climate-related financial risks.
- ***Energy sources are shifting: the energy market is undergoing a revolution***: indeed, renewable energy sources are becoming more affordable and scalable.
- ***Technology is changing what consumers demand and how they consume***: most economic sectors are undergoing significant business model changes and experiencing paradigm shifts.
- ***Social media is driving convergence in social norms***: social media, which has no geographic boundaries, has the power to reshape the cultural blueprint of countries. For investors, this has repercussions ranging from changes in customer preferences and traditional election patterns to demand new regulations.
- ***Longer life expectancy***: according to a study pursued by the United Nations, by 2050, 2.3 billion of the worldwide population will be over 65 years old.
- ***Demographic composition is changing***: Baby Boomers are being replaced by Millennials and Generation X in the position of influence, reshaping the corporate, financial, and political environment.
- ***Regulations constitute a driving force***: ESG considerations have prompted new regulations in an increasing number of countries, which directly affects the credit fundamentals.
- ***Globally extended value chain***: the value chain of large corporations is shifting toward a global scale.

Investors are generally driven to make responsible investments by mainly two reasons. First, investors aim to pursue value alignment; therefore, they seek to ensure that the asset managers they appoint make investments consistent with their ethical and broad societal values. Furthermore, investors are motivated to invest responsibly for risk management purposes; taking environmental, social, and governance (ESG) factors into account enable investors to obtain non-financial data that may influence financial performance. These could include, for instance, the need for robust governance, concerns about workplace policies, or fear of global warming[68].

[68] Barclays, 2016

The different investment purposes – value alignment and financial performance- require an adjustment in the interaction between investor and investee. Accounting statements and other financial data are no longer sufficient to thoroughly evaluate a corporate investment's nature and business prospects in a constantly changing environment. It becomes essential to acknowledge and consider non-financial determinants of corporate performance[69]. Therefore, there is a need for further information to describe the risks posed by harmful elements – i.e., when corporate actions result in pollution, which affects the general population. It is necessary to link these risks to company behaviors and organizational procedures that directly or indirectly affect the corporation's sustainability. However, this stage demands analysis and empirical research since the negative impact is highly linked to the sector in which the company operates; thus, utility companies are more exposed to environmental risks than software ones. Furthermore, the proper application of ESG practices may address the requirement to integrate traditional financial reporting with a more comprehensive examination of sustainability, reflecting a long-term risk management approach[70].

Investors generally believe that ESG integration is directly related to future company performance, although there may not be adequate support for this claim. Investors frequently consider the ESG as an act of faith, in the sense that desired company behaviors will ultimately be advantageous in the long-term. However, ESG elements differ in nature, and each one might affect investments differently. For instance, most investors concur that governance is closely related to financial performance, whereas environmental and social matters enjoy less consensus. The nature of ESG could be described as follow:

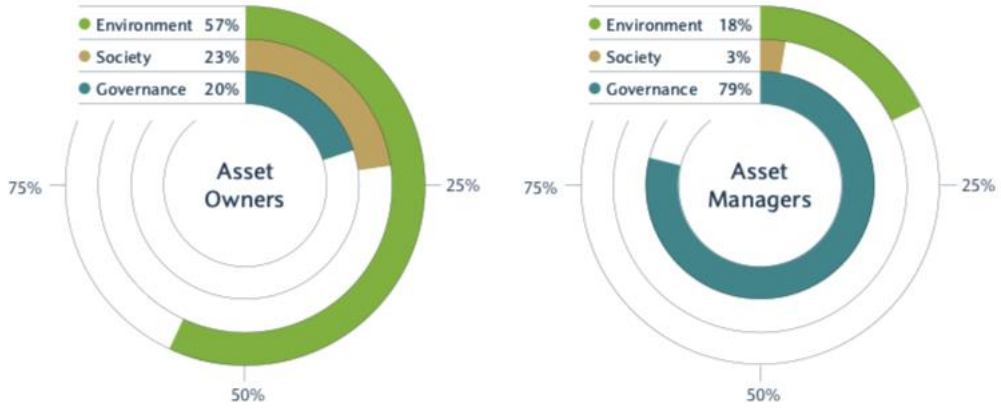
- Governance measures how effectively a firm is run and how well shareholder interests are prioritized. It can be used to gauge the effectiveness of the management.
- In contrast, the Environmental and Social factors represent the risk and opportunities frequently peculiar to the sector and the activities of a company. Therefore, there is an indirect connection between E and S and future performance.

Along the investment chain, several ESG perspectives can be found. In 2016, Barclays surveyed large asset managers, and it was discovered that they frequently have different opinions about the impact of E, S, and G than asset owners. According to the study, managers consider governance more relevant to financial performance, while asset owners place greater importance on the environment. As shown in Table 18, 57% of the asset owners consider the

[69] Barclays, 2016
[70] Barclays, 2016

environment the most relevant factor, whereas 79% of the asset managers place more importance on governance matters.

Table 18. Asset Owners and Asset Managers' Preferences on ESG



Source: Barclays, 2016

Social norms affect market outcomes and impact economic behaviors. In recent years, social and environmental responsibility has become a societal central point, and this has overflowed into the financial markets. However, it is still unclear why investors include ESG data in their investment evaluation, whether they use it for performance, financial or norm-based reasons[71]. Zadeh & Serafeim, with the collaboration of Bank of New York Mellon, carried out a survey taking several investment firms as a sample to comprehend better the overall rationale behind using ESG information. On a value-weighted basis, the responders counted for 43% of the global institutional asset under management (AUM), reaching 31 trillion dollars as of 2015. The responding organizations can be defined as part of the mainstream investors insofar as 70% reported deploying less than 10% of their AUM to ESG investments, and half reported no ESG allocation. The study addressed various ESG-related questions, including what motivates investors to use ESG information, what barriers stand in the way of using ESG data in the investment decision-making process, how investors utilize information, and how they plan to use ESG data going forward. However, only the first question will be considered to understand why investors should adopt ESG. According to Zadeh & Serafeim's findings, an overwhelming 82% of the responding investors considered ESG data in the investment process. Table 19 provides a summary of the study[72].

[71] Amel-Zadeh & Serafeim, 2018
[72] Amel-Zadeh & Serafeim, 2018

Table 19. Investors' Reasons Behind the Use of ESG Data

		All (N = 419)	AUM Size			Region		
		(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Response		Large	Small	Diff.	US	Europe	Diff.
	Yes, because…	82.1%	85.9%	80.3%		75.2%	84.4%	
1	…ESG information is material to investment performance	63.1	60.3	64.5		55.7	64.4	
2	…of growing client/stakeholder demand	33.1	54.3	22.4	**	33.0	39.3	
3	…we believe such policy to be effective in bringing about change at firms	32.6	31.9	32.9		25.8	40.7	*
4	…it is part of our investment product strategy	32.6	43.1	27.2	**	47.4	30.4	**
5	…we see it as an ethical responsibility	32.6	25.0	36.4	*	18.6	40.7	**
6	…we anticipate it to become material in the near future	31.7	31.9	31.6		29.9	37.0	
7	…of formal client mandates	25.0	37.1	18.9	**	23.7	30.4	
	No, because…	17.9%	14.1%	19.7%		24.8%	15.6%	
1	…there is no stakeholder demand for such policy	26.7	15.8	30.4		21.9	24.0	
2	…we lack access to reliable nonfinancial data	21.3	21.1	21.4		18.8	32.0	
3	…ESG information is not material to investment performance	13.3	5.3	16.1		21.9	4.0	*
4	…we believe such policy to be ineffective in inducing change at firms	12.0	15.8	10.7		12.5	16.0	
5	…it would violate our fiduciary duty to our stakeholders	12.0	5.3	14.3		21.9	8.0	
6	…such information is not material to a diversified investment portfolio	10.7	5.3	12.5		6.3	16.0	
7	…including such information is detrimental to investment performance	4.0	5.3	3.6		6.3	4.0	
	p-Value of difference (yes vs. no)	<0.001	<0.001	<0.001		<0.001	<0.001	

Source: Zadeh & Serafeim (2018)

Table 19 demonstrates that 63% of investors consider ESG factors to affect investment performance, with Europeans slightly outperforming other investors, although this gap is not statistically significant. The remaining options are part of a different cluster: a significantly higher percentage of respondents from large enterprises than from small firms consider stakeholder/client demand (54% vs. 22%, p-value 0.01) and the investment product development (43% vs. 26%, p-value 0.01). In contrast, small companies typically take more ESG information into account, such as ethical responsibility (36% vs. 25%, p-value 0.05). Additionally, a far higher proportion of European investors than US investors believe that ESG regulation is beneficial in changing the behavior of companies. Accordingly, the survey indicates that the usage of ESG information is driven by financial rather than ethical concerns, although this varies depending on the geographical area considered[73].

In their study, Henisz, Koller, and Nuttall outlined links that demonstrate that a compelling ESG offer is financially advantageous. Indeed, they claimed that there is a connection between

[73] Amel-Zadeh & Serafeim , 2018

ESG and cash flow, which is identified in the improvement of value creation. Although the five links are a way to approach ESG systematically, the study does not guarantee that each link will be applicable or applicable to the same extent in every situation. Some are more likely to occur in specific industries or sectors, while others will be more widespread in specific geographical areas. Regardless of a company's location or business model, all five links should be considered since the potential for value creation is too significant. The aforementioned five links are the following:

- ***Top-line growth***: a powerful ESG proposition enables businesses to enter new markets and grow within existing ones. When governmental bodies trust the corporate actors, they are more willing to grant access, approvals, and licenses that create additional growth opportunities.
- ***Cost reductions***: ESG can significantly reduce costs as well. Effective ESG implementation has several benefits, including the ability to reduce rising operating costs (such as the price of raw materials and the actual cost of carbon or water).
- ***Reduced regulatory and legal interventions***: companies may exercise more strategic freedom due to a more robust external value proposition, which reduces regulatory pressure. In fact, across industries and regions, strong ESG practices help lower companies' probability of adverse government actions.
- ***Employee productivity uplift***: a meaningful ESG proposal may support companies in attracting and retaining quality employees, improving employee engagement by fostering a sense of commitment, and boosting overall productivity. Shareholder returns and employee satisfaction are positively correlated.
- ***Investment and asset optimization***: a strong ESG proposition can improve investment returns by allocating resources to more attractive and sustainable alternatives (i.e., renewables, waste reduction, and scrubbers). Additionally, it can help companies in avoiding stranded investments that would not be profitable due to long-term environmental issues (i.e., massive write-downs in the value of oil tankers)[74].

[74] Henisz , Koller, & Nuttall, 2019

1.5 The Incorporation of ESG Factor: Myth vs. Reality

There are conflicting views on how ESG should be incorporated, especially when considering institutional investors' duties. Some institutional investors are reluctant to change the governance procedures since they believe that doing so would conflict with the beneficiaries' financial interests. ESG factors are typically considered non-financial elements. Hence it is challenging to incorporate them into a traditional financial risk model. ESG factors are frequently viewed as long-term investing components, in contrast to institutional investments that focus on short-term financial performance. In fact, institutional investors can assess the performance on a short-term basis due to the widespread use of quarterly reporting cycles. Moreover, institutional investors may also frequently fear that there is a trade-off between the interests of today's beneficiaries and those of tomorrow. For instance, a pension fund believes that a corporation looking for new investors may harm the environment in the long-term, even though its stocks will perform well in the short-term[75].

As discussed in section 1.2, there are seven specific approaches to incorporating ESG issues into portfolio construction. Whether institutional investors decide to include ESG factors into their framework depends on the extent to which they estimate that these issues actually impact their ability to fulfill their long-term obligations. In addition, individuals have different perspectives on what obligations investors have regarding ESG integration. In particular, it is possible to classify investors into four categories according to their investment policies[76]:

- ***Traditional investors***, who refuse to incorporate ESG factors because they believe that it may hurt their ability to meet their financial obligations. According to MPT, this suggests that they consider all ESG risks and opportunities are already factored into any potential investment.
- ***Modern investors***, who believe that pricing inefficiencies exist and thus are willing to integrate ESG factors to the extent that they influence corporate financial valuations and, consequently, portfolio returns.
- ***Broader goals investors***, who, as "modern investors," recognize that ESG factors impact portfolio performance. They also feel that their duties to their beneficiaries

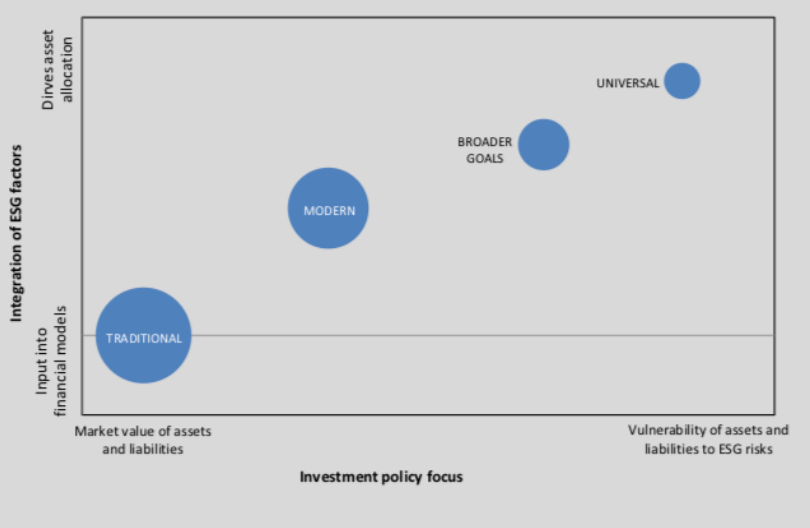
[75] OECD, 2017
[76] OECD, 2017

include the consideration of their long-term financial objective and non-financial well-being. Broader goals investors are willing to make certain financial compromises in support of ESG-related principles (i.e., avoiding stocks of companies operating the tobacco industry).

- ***Universal investors*** completely include ESG variables in their investment process since they feel they have the financial responsibility to support the global financial system's stability. ESG factors are the drivers of future systemic risk. Due to the impact of ESG issues on macro-economic performance and the financial stability of the corporate sector, they will align their portfolios with ESG objectives even though they do not consider these as non-financial goals (as for "broader goals investors"). Universal investors frequently give substantial weight to environmental aspects and seek investments that positively influence the environment.

Table 20 summarizes the four perspectives, positioning the four types of investors on the x-axis in accordance with their investment philosophy and the integration of the ESG factors into their investment decisions on the y-axis[77].

Table 20. The four interpretations of Investors' Duties and ESG Integration



Source: OECD (2017)

[77] OECD, 2017

In their study, published in 2016, Kotsantonsis, Pinney, and Serafeim claimed that there are several misconceptions surrounding the ESG concept. They have identified six prevalent misconceptions regarding ESG investments, including the widespread notion that corporates' efforts to address environmental and social challenges necessarily result in lower long-term profitability and value.

Myth Number 1*: ESG programs reduce returns on capital and long-term shareholder value*.

- Companies that are committed to ESG are gaining market share in the capital, labor, and product sectors. Portfolios that have integrated "material" ESG indicators have also given investors average returns that are higher than those of traditional portfolios while posing a reduced risk.

Myth Number 2: ESG is already well integrated into mainstream investment management.

- The UNPRI members have mainly agreed to adhere to a set of responsible investment principles, which is a threshold that falls well short of incorporating ESG factors into investment choices.

Myth Number 3*:* Companies have no control over the types of shareholders that purchase their shares. Corporate managers frequently have to sacrifice sustainability goals to reach the quarterly profitability targets of investors who are becoming progressively more focused on the short-term.

- Companies that pursue significant sustainability measures and make them public in integrated reports and other investor communications typically attract disproportionately more long-term shareholders.

Myth Number 4*:* ESG data for fundamental analysis is scarce and unreliable.

- In the past ten years, significantly more "value-relevant" ESG data on companies has become accessible thanks to the efforts of reporting and investor organizations like SASB and Ceres, as well as CDP data suppliers like Bloomberg and MSCI.

Myth Number 5*:* ESG adds value almost entirely by limiting risks.

- Companies with high ESG scores have also experienced increased operating efficiency and expansion into new markets, in addition to lower risk and cost of capital.

Myth Number 6*: Considering ESG factors might conflict with some investors' fiduciary duty*.

- In 2015, ERISA changed its former guidance to pension funds regarding the legality of taking into account "non-financial" aspects when investing in companies. Several ESG

elements have been shown to have favorable correlations with corporate financial performance and value[78].

1.6 ESG in Credit Ratings

Over the past ten years, one of the most significant advancements in the financial sector was the inclusion of environmental, social, and governance information into the investment decision-making process[79]. As a matter of fact, investors boosted their spending on ESG ratings from 200 million to 500 million between 2014 and 2018 to better capture the disclosure of ESG information from thousands of publicly listed companies[80]. ESG, as a collection of non-financial data, can affect borrowers' cash flow and companies' likelihood of default in two ways, which both have an impact on credit ratings. ESG factors should have a positive effect on companies' credit ratings, meaning that by enhancing their ESG performance, they will increase the probability of receiving higher credit rating levels[81]. Therefore, ESG taking into consideration ESG parameters is essential when assessing a borrowers' creditworthiness. Concerns about stranded assets as a result of climate change, as well as a lack of transparency in accounting processes, might result in unforeseen losses, inefficiencies, or litigation for corporations.

Credit agencies and investors should strategically take into account the potential of the ESG factors as financial material rather than non-financial in order to thoroughly address the key market and idiosyncratic risk in the debt market. Although credit ratings have become an essential source of risk information, there is still limited understanding of how to use them[82]. In their research carried out in 2021, Christensen, Serafeim, and Sikochi stated that ratings show a high degree of discrepancy between rating providers, particularly when they compare how different ESG suppliers rank the S&P 500's 500 largest companies[83]. On the other hand, they are significantly more in agreement when the same companies are assessed for their creditworthiness. This issue is significant primarily because market participants may be misled by ESG ratings by the lack of a shared awareness of what strong ESG performance entails[84].

[78] Kotsantonis, Pinney , & Serafeim, 2016
[79] Christiansen, Serafeim, & Sikichi, 2021
[80] Gilbert, 2019
[81] Devalle, Fiandrino, & Cantino, 2017
[82] Kiesel & Lücke, 2019
[83] Christiansen, Serafeim, & Sikichi, 2021
[84] Christiansen, Serafeim, & Sikichi, 2021

The extent to which firms disclose ESG information, according to Christensen, Serafeim, and Sikochi's study, may help explain this discrepancy. The discordance is the result of different information or interpretation of information. They claimed that the high subjectivity of interpretation on the type of ESG information causes higher disagreement, as disclosure raises the possibility of misinterpretation of information. In particular, ESG rating agencies are more likely to concur without disclosure if they employ similar standards and computation methods. Furthermore, they observed that rather than governance disclosures, this effect is primarily driven by environmental and social disclosures. Nevertheless, over time, there has been an agreement on measures for assessing a firm's performance on particular ESG issues and on how to interpret the data contained in each indicator. This could lead to a decrease in the relation between disclosure and rating discrepancy[85].

[85] Christiansen, Serafeim, & Sikichi, 2021

CHAPTER 2: THE LINK BETWEEN ESG AND CREDIT RISK

In this chapter, corporate social responsibility will first be examined. In particular, two factors will be considered: the radical change over time and the potential effects on corporate performance. Secondly, the focus will be on corporate creditworthiness and the variables that affect it—starting by emphasizing the ESG elements and how this variable can affect companies' creditworthiness variables, which can impact credit risk indicators. A few features of creditworthiness regarding ESG will be discussed in the third and fourth paragraphs: corporate efficiency and cost of capital.

2.1 Corporate Social Responsibility

In the 1950s and 1960s, theoretical writings and academic research focused on the social level of analysis, giving it a useful context. The social movements of that time, as well as society's growing awareness of issues like pollution and population expansion, most significantly influenced these years. The topic of the debate was social issues like labor rights or the depletion of resources. Throughout this decade, the role of the businessman was revolutionized to the extent that in terms of economic and human values, the businessman has a duty towards society. Moreover, social responsibility may be related to a company's economic returns.

Nevertheless, a company's responsibility extends beyond its legal and economic obligations. Additionally, corporates should consider politics, community welfare, education, and employee happiness. On the other hand, it is necessary to mention Milton Friedman's skepticism towards the concept of CSR laid down in 1970 in the article "The Social Responsibility of Business is to Increase its Profits"[86]. According to Friedman, business managers have a duty toward the owner and are free to support philanthropic causes with their salaries as employees. He added that pursuing these goals using corporate funds would be wrong and unjustifiable since such moves would require funding that was devoted to shareholder returns or, if financed by boosting selling prices, from consumer funds[87]. A

[86] Friedman, 1970
[87] Hill, 2020

corporation has obligations only towards its shareholders[88]. The social movements of the 1970s and the new laws addressing environmental, product safety, and labor rights issues significantly impacted CSR. This was also reflected in the research conducted during those years, which supplied businesses with advices on how to comply with the additional obligations imposed by this new regulation[89]. As a result, in 1980, the development of the CSR concept was indirectly influenced by the most important societal concerns and expectations of corporate behaviors, such as environmental pollution, employment discrimination, consumer abuse, employee health and safety, the decline of urban life, and abusive practices of multinational corporations. A study by Jones in 1980 asserts that CSR should be viewed as a decision-making process that affects corporate behaviors. Terms like stakeholder management and business ethics became widespread around that decade[90].

Companies began to worry about competitiveness, reputation, worldwide visibility, and the expansion of stakeholders' networks in 1990 with the rise of globalization, which led to a rapid increase in corporate worldwide impact and capitalism. This paved the way for stakeholder theory, corporate social responsibility, and corporate citizenship, which resulted in ambiguity in the definition of CSR[91]. This meant that by the end of 1990, there was still not a universal agreement on the purpose of corporate social responsibility[92].

According to several researchers, the 2000s highlighted how companies needed to adapt to social expectations and be motivated by the quest for sustainability in order to play their new role in society. This revealed that corporate social responsibility was seen as our strategic decision for corporates throughout these years. In particular, the research carried out by Werther and Chandler concentrated on the application of strategic CSR as a component of brand management with the intention of pursuing and preserving legitimacy in a multinational brand setting[93]. Alternatively, according to Porter and Kramer, companies can gain a competitive advantage through strategic CSR. Thus, following their recommendations, a business should first consider "inside-out" to define the social impact of its value chain and identify both favorable and unfavorable consequences of its actions on society, focusing on those with the most strategic value. The firm can then use an "outside-in" approach to analyze how social activities affect productivity and the execution of its business objectives[94]. Husted

[88] Friedman, 1970
[89] Carroll, 2008
[90] Jones, 1980
[91] Lantos, 2001
[92] Carroll, 2008
[93] Werther & Chandler, 2005
[94] Porter & Kramer, 2006

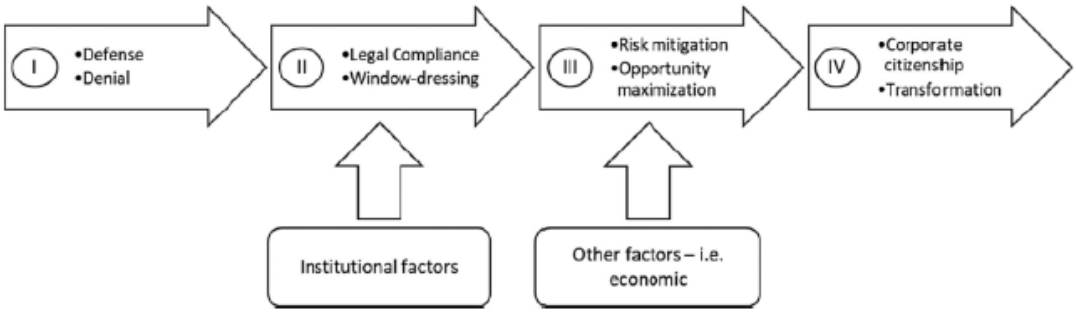
and Allen supported the notion that strategic corporate social responsibility can create value by claiming that both the media's reporting on CSR and the firm's favorable reputation can be linked to value creation. They further stated that attracting new clients and maintaining customer loyalty or the primary strategies[95].

In the 2010s, the Sustainable Development Goals and the Paris Agreement have had a significant impact on how companies are perceived globally. Since then, although CSR awareness continues to be centered on the production of shareholder value, CSR has been focused on specific areas that may be significantly relevant to the SDGs.

As described by Chandler, the recent development of CSR is also crucial to note. The latter emphasized the significance of sustainable values as one of the SCSR's primary goals. Chandler provided a slightly modified definition of CSR reflecting a different viewpoint on the creation of value: *the integration of a holistic CSR approach into a company's strategic planning and core operations to run the business in a way that maximizes value over the medium to long-term for a variety of stakeholders*[96].

Corporate Social Responsibility has become a strategic concern for businesses over the past decade. However, there is still a lack of thorough knowledge of how CSR affects businesses[97]. According to Karwowski and Raulinajtys-Grzybek, the literature has emphasized the maturity of CSR initiatives[98]. Table 21 outlines the various stages of CSR maturity:

Table 21. The Phases of CSR Development



Source: Karwowski & Raulinajtys-Grzybek (2021)

Table 21 demonstrates that firms first have a defensive attitude about CSR and even attempt to reject or minimize it. In the second phase, businesses adopt a more mature strategy and

[95] Husted & Allen, 2007
[96] Chandler, 2019
[97] Albuquerque, Koskinen, & Zhang, 2017
[98] Karwowski & Raulinajtys-Grzybek, 2021

frequently engage in window-dressing and legal compliance. At this point, companies rely heavily on institutional factors that can influence their performance. The following step encapsulates opportunity maximization and risk reduction. Companies now seek to assess their social, environmental, and economic effects with the aim of minimizing the potential adverse consequences while maximizing the good ones. The highest level of maturity causes a firm to perceive corporate citizenship as a whole rather than just its individual interests.

The third stage is the main focus of Albuquerque, Koskinen, and Zhang's study. They questioned whether there was a connection between CSR, risk, and value. As a result, they created an industry equilibrium model in which corporates can decide between CSR and non-CSR production technologies while still embedding their choices into a common asset-pricing framework. They interpreted a company's investment in CSR technologies as an effort to differentiate its products[99].

According to the theory, a CSR company deals with less elastic demand in terms of prices, leading to better profit margins and, things being equal, higher product prices. Additionally, higher profit margins result in lower profit elasticity to aggregate shocks, which lowers systematic risk and increases company value. Nevertheless, more businesses adopt CSR practices and incur higher costs due to increased profit margins. These greater expenses have the opposite impact of the initial partial risk reduction by increasing systematic risks. According to Albuquerque, Koskinen, and Zhang, the strength of the two effects depends on the proportion of CSR goods consumers choose to spend their money on. Indicating that marginal CSR companies have lower systematic risk and a higher valuation than non-CSR firms is implied by the fact that a small expenditure share on CSR items reduces the proportion of CSR firms[100].

It is also essential to draw attention to Karwowski and Raulinajtys-Grzybek's research, which examines the risk categories on which CSR actions have the most significant influence. Together with reputational risk, they concentrated on ESG risks. The two academics are primarily interested in examining the role of CSR in risk reduction with a focus on three objectives: the analysis and classification of the primary areas of CSR actions, the study of the risk profile of companies, and the assessment of the influence of CSR on corporate risk[101].

They divided risks into two categories: the first is the sustainability risk, often known as the ESG risk, and it has three components in total. The other categories include i) governance risk,

[99] Albuquerque, Koskinen, & Zhang, 2017
[100] Albuquerque, Koskinen, & Zhang, 2017
[101] Karwowski & Raulinajtys-Grzybek, 2021

which results from management structures, employee relations, remuneration of relevant staff, tax and legal compliance; ii) environmental risk, which refers to the potential threat effluents, emissions, and resource depletion pose to living organisms and the environment; iii) social risk refers to a global phenomenon with direct implications for society depending on the cultural, political, and economic context. ESG risk may have an impact on operational, regulatory, and financial risk areas as well. The second risk is represented by the reputational risk, which is related to how the public views the company and how others perceive it in its environment[102].
A corporate can establish its reputation and engage in CSR activities to improve its image among its stakeholders, and it is generally believed that accomplishing this requires a strong commitment. A strong reputation not only results in favorable evaluations from stakeholders but also positively affects profitability because, in general, consumers favor products that are produced in a socially responsible manner. Additionally, the firm will be able to reduce risk in economic downturns thanks to consumers' satisfaction and loyalty as a result of CSR engagement, mainly if the firm depends on a loyal customer base[103].
In 2021, Karwowski & Raulinajtys-Grzybek examined the relationship between Environmental, Social, Governance, and Reputational Risk (ESG & R) And CSR activities. They discovered consistency between the importance of specific risk categories and CSR initiatives and a correlation between the variables under consideration. Additionally, a high degree of consistency in the rating of risk categories and CSR initiatives was observed for over 60% of the companies[104].

2.2 Company Creditworthiness: The Driving Forces

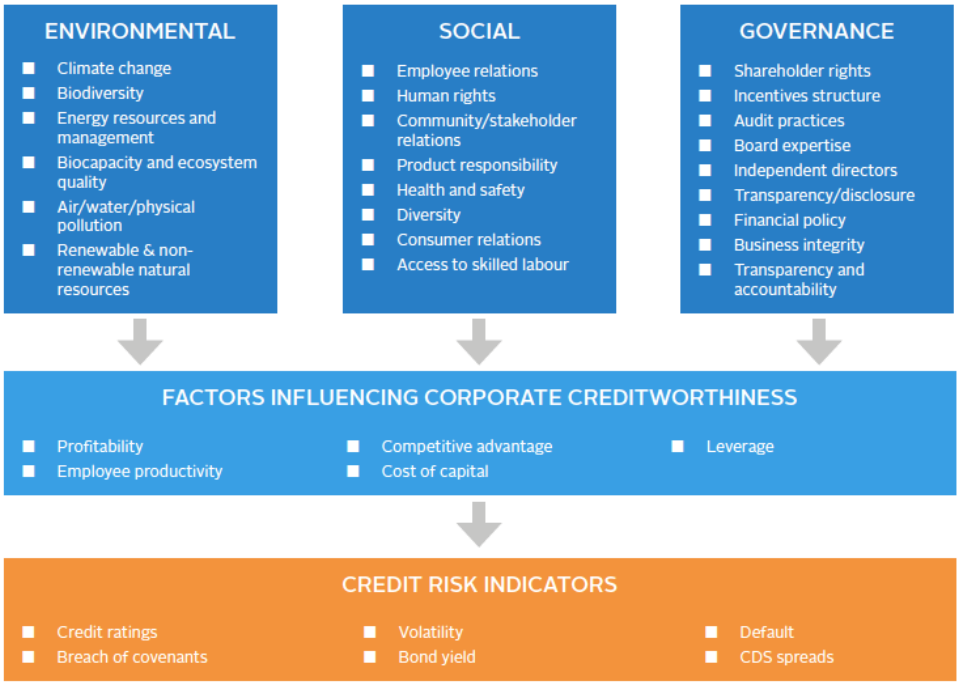
Following the global financial crisis of 2008, which exposed public finances to the impact of private governance risk affecting the structure and operation of the financial system, institutional investors are cautiously paying attention to corporate governance as a source of risk and opportunity. Enron, Parmalat, and Lehman Brothers or just a few examples of corporate governance that resulted in business failures. Corporate bond performance it's typically determined by several variables, including the bond's payment structure, duration, and market risks (i.e., changing interest rates and liquidity). Thus, just as diversification and

[102] Karwowski & Raulinajtys-Grzybek, 2021
[103] Karwowski & Raulinajtys-Grzybek, 2021
[104] Karwowski & Raulinajtys-Grzybek, 2021

selection are essential, likewise are the portfolio decisions[105]. Furthermore, investors may be exposed to significant risk due to governance, environmental, and social issues. It is complicated to assess how credit quality and a company's health or energy efficiency are related. A firm's competitive position, profitability, productivity, expected future value, and cost of capital are all considered when determining its creditworthiness[106]. Nevertheless, the following components can be linked to the ESG factors: high fines for pollution can reduce a firm's cash flow, restrictions on climate change can negatively impact capital expenditure and impair energy company margins, and child labor scandals can damage your company's reputation. For instance, according to UN PRI, bondholders should take care of these risks and assess their relevance to creditworthiness and investment performance[107].

Table 22 summarizes the connections between ESG characteristics, credit components, and creditworthiness.

Table 22. The Link Between ESG, Credit Factors, and Credit Risks Metrics



Source: UN PRI, Corporate Bonds: Spotlight on ESG Risks (2013)

[105] Allianz Global Investors GmbH, 2017
[106] UN PRI, 2013
[107] UN PRI, 2013

Several research papers have examined the connection between ESG and stock prices. However, these studies also offer solid evidence of a link between ESG factors and credit quality.

In 2011, Bauer and Hann conducted research to examine the impact of environmental management on bond investors. The study's outcome depicts a situation in which poor environmental practices have a detrimental effect on creditworthiness through legal, reputational, and regulatory risks. In the analysis, the researchers evaluated bonds issued by 582 US firms between 1996 and 2005, incorporating environmental performance data from an independent rating institution. The core element of Bauer and Hann's study is that environmental issues and inadequate environmental management have an impact on borrowing's solvency, exposing businesses to risk related to legal, regulatory, and reputation. They investigated the relationship between the bond yield spread, the bond rating, and the long-term issuer ratings after developing their study from a measure of environmental strength and company concerns. The outcome of the research demonstrates that businesses with environmental issues often pay more for debt financing and have lower bond and issuer ratings. On the other hand, companies with active environmental management enjoy lower borrowing costs and a weaker link to a higher credit rating. Additionally, they discovered that efforts made by the company to reduce its incidence of climate change and air pollution through the use of clean energy, energy efficiency, or adherence to climate-friendly policies, as well as the provision of revolutionary products and services with favorable environmental effects, are associated with reduced bond spreads. In essence, the researchers found that environmental issues combined with inadequate environmental management are drivers for a higher cost of debt, lower bond ratings, and lower issuer ratings[108].

In line with Bauer and Hann, Chava, also in 2011, performed research on US companies between 1995 and 2007 that revealed that lenders charge on average 20% higher loan rates to corporates that manage environmental risks inadequately than they do to those that perform better in this area[109].

Another study conducted in 2016 by Barclays uses a spread attribution analysis to address whether ESG elements can effectively reduce credit risk. They specifically discovered that positive leaning in bound portfolios resulted in a slight but consistent performance advantage, with no indication of a detrimental influence. Additionally, the researchers observed that ESG

[108] Bauer & Hann, 2011
[109] Chava, 2011

factors did not significantly impact the price of corporate bonds, and there was no proof that the performance advantage changed as the study period varied. The study then considered the E, S, and G factors separately, concluding that the beneficial effect was most prominent for governance components and weakest for social ones[110].

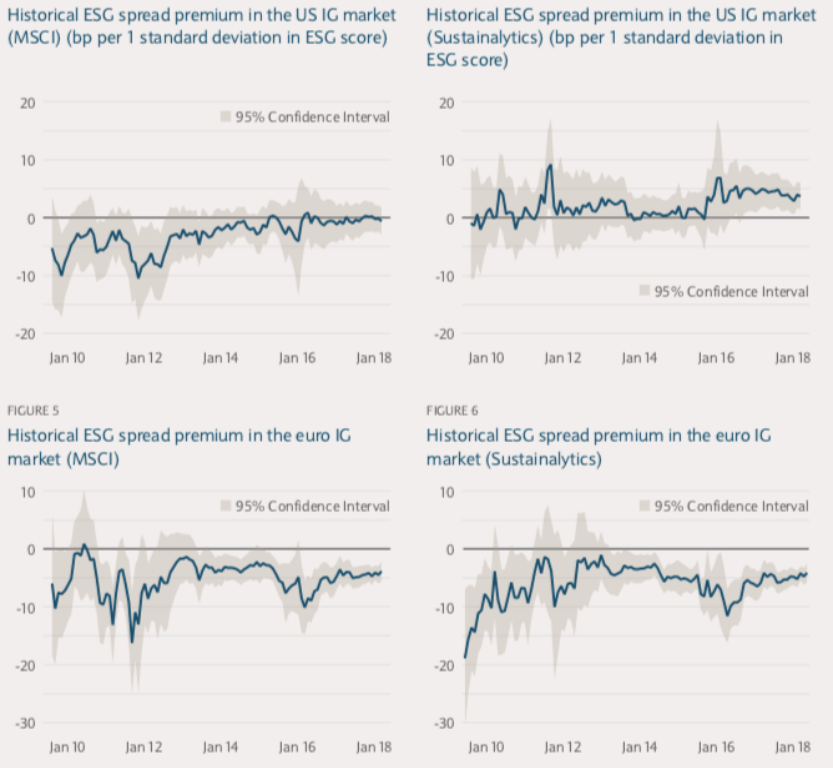
A more recent study by Barclays examined the impact of ESG on the returns of US IG bonds. The researchers considered the corporate bond spread a crucial signal even in this scenario because higher quality bonds often have smaller spreads, resulting in lower income returns over the long run. However, they evaluated the ESG spread premium, which is the difference in spread between high- and low- ESG bonds, to determine whether ESG impacts corporate bonds' pricing. Additionally, all the price-influencing variables, including credit score, industrial sector, time frame, and geographic area, have been evaluated[111].

Bonds with higher ESG ratings typically cost more than those with lower ratings if the difference in ESG spread is negative. In this circumstance, investors might opt for high-ESG bonds resulting in lower incomes to own bonds with higher ESG valuation. On the other hand, high-ESG bonds will eventually offer larger returns than low-ESG ones if the ESG spread premium shrinks.

Table 23 depicts the development of ESG spread premium in Europe and the USA according to two different providers: Sustainalitycs and MSCI.

[110] Barclays, 2016
[111] Barclays, 2018

Table 23. ESG Spread Premium Europe vs. US



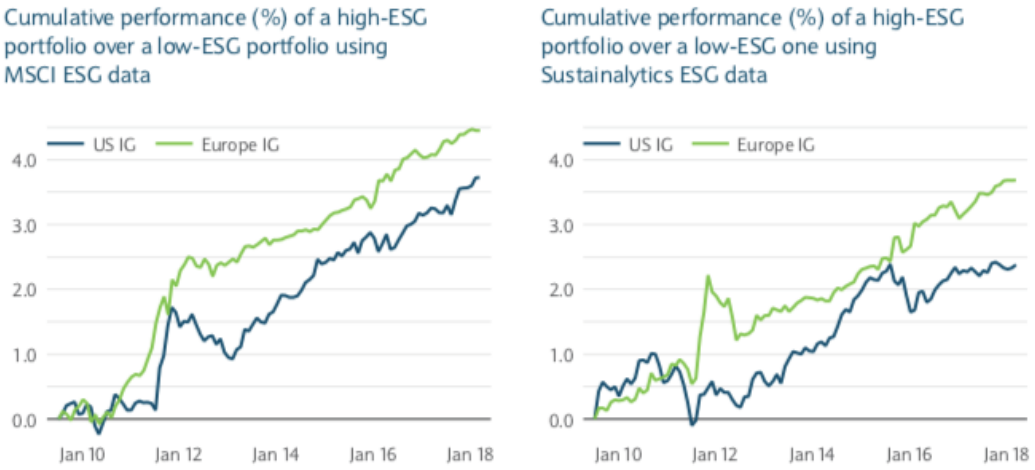
Source: Barclays (2018)

Given the growing interest in sustainable investing, one could anticipate a rise in the price of high-ESG bonds. However, there was no evidence of a declining trend in the ESG spread premium; instead, it appears to be constant in Europe and rising in the US. As a result, any outperformance of high-ESG bonds over low-ESG bonds cannot be attributable to an increase in ESG bond quality throughout the time considered[112].

At this stage, the Barclays study examines the historical returns of diversified portfolios that reflect all key index exposures aside from a favorable or unfavorable ESG bias. The performance gap between portfolios with high and low ESG levels is an example of how the ESG aspects affect returns. Barclays claims that the difference between the two portfolios could be interpreted as an ESG performance factor since the return appears to favor high-corporate bonds over low-ESG ones when all other factors are held equal. Using information from MSCI and Sustainalytics, Table 24 displays the cumulative performance correlated with a high-ESG portfolio over a low-ESG one[113]:

[112] Barclays, 2018
[113] Barclays, 2018

Table 24. High-ESG Portfolio compared to Low-ESG Performance



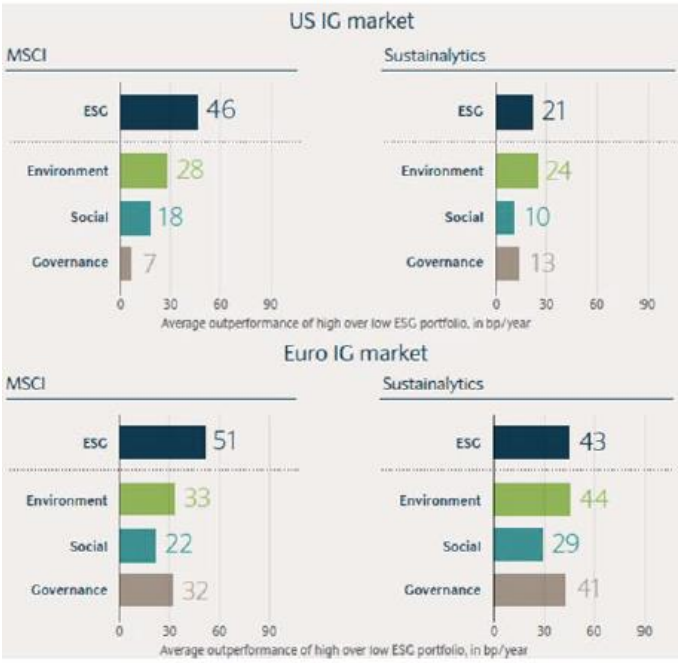
Source: Barclays (2018)

Table 24 demonstrates that the high-ESG bond portfolio outperforms low-ESG ones, according to data from MSCI and Sustainalytics. Over the analyzed period, the returns in both scenarios have the inclination to rise and be favorable. Therefore, the new study supports the findings of the prior one, which found that ESG inclination improved performance in the ESG market. The Barclays analysis also looked into which components of the environmental, social, and governance spectrum had the most impact on bond performance in the financial market. Starting with data from MSCI and Sustainalytics, they structured the study for US and Europe. For each provider, they then developed unique portfolios to assess the performance related to the aggregated ESG, and finally, each one individually. Comparing high-ESG portfolios to low-ESG ones yields the average difference; specifically, the variables employed to measure this difference were basis points per year[114].

It is noteworthy to highlight that, in contrast to the Barclays report of 2016, Environment, and not Governance, was the best single pillar most closely inclined to outperform in the US. Instead, the result for Europe revealed less difference across the single pillars; in fact, all three have positive performance, with a more minimal impact on the Environmental score and a smaller one on the social score. In Europe, for instance, the annualized outperformance of high-ESG over low-ESG portfolios was 43 bps per year, according to MSCI, and 51 bps for Sustainalytics between 2009 and 2018, as illustrated in Table 25[115].

[114] Barclays, 2018
[115] Barclays, 2018

Table 25. The Impact of E, S, and G Individually in Investment Grade Markets



Source: Barclays (2018)

An identical study was carried out for the high-yield market. The researchers discovered that high-ESG HY portfolios typically outperformed low-ESG ones, albeit this was not always the case. In terms of MSCI and Sustainalytics, the portfolio strategies demonstrated greater negative returns on social and environmental variables between 2012 and 2018. It is also crucial to point out that for both data suppliers, the Governance aspects predicted the best returns.

In general, the Barclays study carried out in 2018 strengthened the findings of the earlier one in several ways. However, some skepticism does emerge; the analysis questioned what could be responsible for the outperformance of high-ESG portfolios, as there is no consistent change in the ESG valuation premium. According to the research, companies that are better equipped to manage the wide range of non-financial risks taken into account by ESG scores may be less prone to experience unpleasant surprises. ESG returns may manifest as idiosyncratic risk: low-ESG companies may be more inclined to underperform in the market due to specific unfavorable circumstances (i.e., environmental disasters or labor disputes)[116].

The study conducted in 2008 by Bradley, Chen, Dallas, and Snyderwine also reveals an adverse relationship between ESG and bond spread. Focusing on a panel of 774 different companies between 2001 and 2007, they specifically looked at the relationship between corporate

[116] Barclays, 2018

governance parameters, credit ratings, and bond spreads. First, the researchers discovered that a firm's financial status is the primary determinant of its credit rating. Furthermore, they found that, even after accounting for the firms' economic condition, governance characteristics such as transparency, ownership structure, shareholder rights, board structure, and executive compensation are highly associated with credit ratings. Additionally, it was discovered that businesses with stable boards have higher credit ratings and lower bond spreads. Indeed, according to the researchers, more robust board stability assists in considering the longer-term interests of businesses as a whole, which benefits bondholders[117].

In a related manner, Bhojraj and Sengupta, in 2003, demonstrated a negative correlation between high levels of block institutional ownership – defined as institutions holding more than 5% of a company's stock- and credit rating. The researchers also emphasized the significant impact that stronger governance had on lower-rated bond yields. They discovered, in essence, that lower returns are associated with robust governance, as shareholders effectively oversee the management[118].

Instead of concentrating on bond yields, Devalle, Fiandrino, and Cantino in 2017 emphasized the correlation between ESG performance and credit ratings. They specifically recommended that ESG variables should be considered in the investment decision-making process due to their impact on borrowers' cash flows and the likelihood that they may default on their loan obligations. Their methodology began by separating the relationship between E, S, and G independently with credit rating on a sample of 56 Italian and Spanish public companies through the use of 15 variables and a total of 840 items. The outcome demonstrated a positive relationship between ESG performance and higher credit ratings. In addition, they discovered that the shareholder score, which measures how equally shareholders are treated, and the community score, which measures the company's commitment to pursuing positive behaviors and upholding business ethics, are statistically significant at the 0.001 level. However, for the environmental score, any noteworthy outcome was attained[119].

The research also looked into the connection between default likelihood and ESG criteria and failed to locate a distinct border in the literature. However, the analysis claimed that if there is a negative correlation between ESG and default probability, it would also have massive

[117] Bradley, Dallas, Snyderwine, & Chen, 2008
[118] Bhojraj & Sengupta, 2003
[119] Devalle, Fiandrino , & Cantino, 2017

consequences. In this regard, ESG ought to play the part of a risk mitigator, aiding in the calculation of investment risk sensitivity and, in particular, default probability[120].

Kim and Li's study carried out in 2021 further demonstrates a favorable link between ESG credit ratings. Additionally, the analysis looked at the connection between ESG and business financial performance, assessing ESG impact either individually or aggregated. The outcome of the study claimed that ESG has a favorable effect on corporate profitability, particularly for businesses with high total asset values. The governance factor has the most significant impact on business profitability out of all the ESG components. Additionally, all ESG elements have a substantial impact on credit ratings when it comes to credit risk: social and governance scores have a positive effect, while the environment has an oddly negative effect[121].

Instead, Kane, Velury, and Ruf in 2005 examined data from KLD, a provider of indexes and research, from 1991 to 2001 to see whether a company's relationship with its employees is related to the risk that financial distress may occur. The researchers also considered several factors that might have an impact on the analysis, such as variations in companies' sizes, liquidity, profitability, leverage, business cycle overtime, and corporate life cycles. In general, the analysis discovered that employee interactions could be another predictor for determining the possibility of financial distress[122].

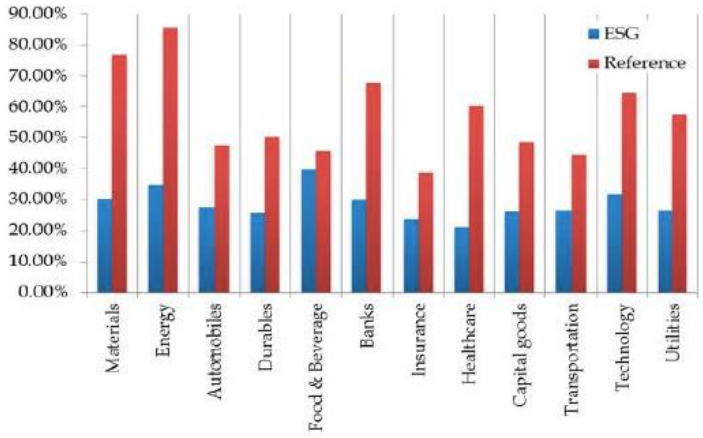
Instead of concentrating on financial distress Li, Zhou, and Xiong attempted to identify the factors influencing bond default in China. In order to calculate the likelihood of an industrial bond default, they took into account a variety of criteria, including industrial and ESG ones. The study specifically evaluated how factors other than financial performance criteria affect a corporation's development. As this factor can influence a firm's credit and operational risk, integrated standards like Environmental Protection, social responsibility, and corporate governance may be considered while making strategic decisions. As a result, the study's findings indicate that bond default is adversely connected with corporate governance, social responsibility, and financial success and favorably correlated with the energy consumption of the company[123].

In order to better understand the relationship between ESG and volatility, Kumar, Smith, Badis, Wang, Ambrosy, and Tavares published in 2016 a valuable analysis of volatility. For a period of two years, they used a sample of 157 listed firms on the Dow Jones sustainability index and

[120] Devalle, Fiandrino , & Cantino, 2017
[121] Kim & Li, 2021
[122] Kane, Velury, & Ruf , 2005
[123] Li, Zhou, & Xiong, 2020

809 that were not. Contrary to conventional financial thinking, which holds that lower risk equates to lower returns, ESG companies exhibit higher returns and less volatility than their peers in the same industry. The analysis also claimed that each industry is impacted by ESG components differently. According to Kumar et al.'s model, the volatility of the stock returns represents the various levels of risk associated with equity stocks. The panel of the ESG-listed companies in their sample, which considers 12 industries, depicts a decrease in volatility by 28.6% on average, indicating that ESG companies bear the lower risk concerning those firms operating in the same industry not ESG compliant. Table 26 presents an overview of the researchers' findings[124].

Table 26. The volatility of ESG vs. Non-ESG Companies



Source: Kumar et al. (2016)

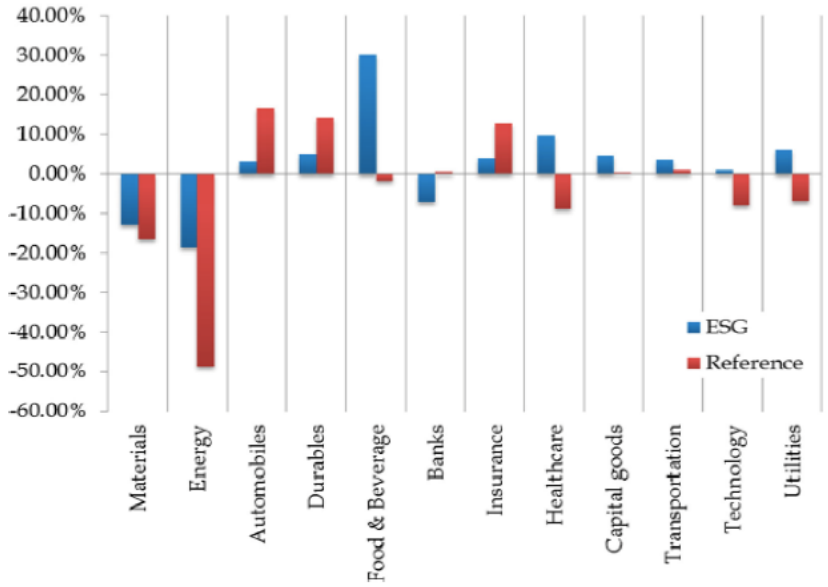
Among the samples examined by Kumar et al., ESG components significantly influence sectors like materials, banking, energy, and technology. Investors may also consider the risk premium that the companies must bear, which is the percentage difference between ESG and non-ESG when making investment decisions. As a matter of fact, equity investments in non-ESG companies carry a risk that is 28% higher than those in ESG companies[125].

As previously indicated, Kumar et al.'s model demonstrated that investments in ESG companies could have greater returns, despite the reduced risk, defying the mainstream opinion that the lower the risk, the lower the returns[126].

[124] Kumar, et al., 2016
[125] Kumar, et al., 2016
[126] Kumar, et al., 2016

In fact, the majority of the panel's ESG companies consistently offer higher returns than their competitors. The average positive impact of ESG on equity return is 6.12%, but we consider the 8 out of 12 ESG companies that perform better, the impact increases to 14.08%. To be more precise, the energy, food and beverage, and healthcare industries exhibit the most significant benefits from ESG considerations, while the auto, durables, and insurance industries present the opposite trends. The advantages offered by ESG in each industry are highlighted in Table 27:

Table 27. Returns of ESG vs. Non-ESG Companies



Source: Kumar et al. (2016)

Therefore, according to Kumar et al., the relationship between risk and return may not truly reflect conventional market thinking: the lower risk provided by ESG practices may also enhance the risk-adjusted return of the investment in these companies[127].

The impact of ESG on credit default swaps (CDS) should also be mentioned. In particular, Höck, Klein, Landau, and Zwergel in 2020 focused their analysis on whether environmental sustainability affected the credit risk of European non-financial companies. They discovered that more sustainable companies often displayed reduced credit risk due to lower reputational, financial, and regulatory risks, which clearly indicates the role of sustainability as a risk mitigator. Furthermore, it appears that only companies with stronger creditworthiness benefit from having environmental scores. Consequently, investment professionals may take

[127] Kumar, et al., 2016

environmental factors into account when making investment decisions and evaluate the moderating impact of a company's creditworthiness[128].

UN PRI claimed that although academics, particularly in the US, concentrate their studies on the relationship between ESG factors and company credit quality across all markets or sectors, practitioners are more inclined to pay attention to the sector, region, timescale, and leverage; hence they are more interested in corporation-specific matters. Following this reasoning, Table 28 illustrates how the ESG variables impact the different sectors. In this instance, the study uses data from MSCI, a provider of investment indices and research. This statistic shows how each category is weighted when calculating an issuer's overall ESG score[129]:

Table 28. ESG Variables Across Different Industries

	ENVIRONMENTAL				SOCIAL		GOVERNANCE
	CARBON INTENSITY (tCO2e per USD million sales)	DIRECT AND INDIRECT WATER WITHDRAWAL (liters per USD million sales)	AIR POLLUTION INTENSITY (tons per facility)	HAZARDOUS WASTE INTENSITY (tons per facility)	FATALITIES (per million employees)	LABOR INTENSITY (employees per USD million sales)	CORRUPTION INDEX (10 = highest bribe incidence)
Utilities	1,237	79	1,853	149	0.1	1.6	6.8
Energy	524	26	550	9,643	0.3	1.5	7.0
Materials	583	44	1,270	7,534	0.1	3.5	5.6
Consumer Staples	67	121	164	71	0.0	4.0	5.5
Industrials	176	25	147	477	0.1	4.4	6.1
Telecommunication Services	34	10	9	112	0.0	3.1	6.3
Health Care	37	19	85	546	0.0	3.4	6.8
Consumer Discretionary	63	23	40	56	0.0	5.5	5.4
Information Technology	52	23	33	121	0.0	4.4	5.4
Financials	44	8	14	53	0.0	2.1	5.8

Source: UN PRI (2013)

As the above table demonstrates, some factors have a greater impact on ESG scores in specific sectors than others. For example, the intensity of carbon and air pollution, which are more common in high-emitting sectors, pose a greater risk to the utilities, energy, and materials industries.

2.3 ESG and Corporate Performance

ESG is frequently linked to a firm's non-financial performance. However, the impact of these aspects on company performance has been growing over time. For instance, as mentioned previously, Amel-Zadeh and Serafeim's survey claims that professional investors predominantly use ESG data for performance targets. A general knowledge of the study of

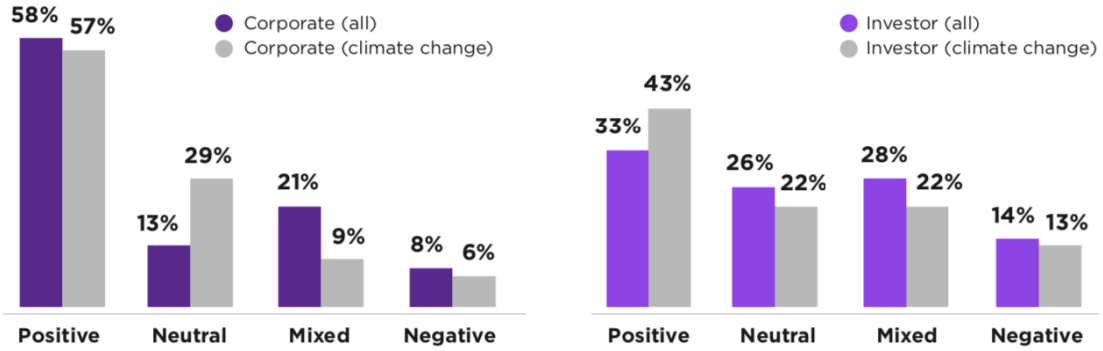
[128] Höck, Klein, Laudau, & Zwergel, 2020
[129] UN PRI, 2013

ESG and corporate firm performance (CFP) was offered by academics like Friede, Busch, and Bassen, who drew on more than 2000 academic studies conducted up to 2015. As a matter of fact, their study, which was based on both vote-count and meta-analysis statistical research, shows a positive correlation between ESG and CFP: supported by the vote-count analysis, 47.9% of the study shows a positive correlation between the two dimensions, compared to 6.9% of negative one. In contrast, the meta-analysis shows a slightly higher percentage, 62.6% of positive relationships and 8.0% of negative relation. Furthermore, it appears that emerging nations and North America had a higher share of positive responses, with North America also registering the lowest percentage of unfavorable ESG to CFP linkages[130].

Following this reasoning, in 2020, Whelan, Atz, Van Holt, and Clark carried out an analysis spanning more than 1000 studies between 2015 and 2020. In particular, those analyses discovered positive relationships between ESG performance and operational effectiveness, stock performance, and lower cost of capital: 58% of the "corporate" studies found a favorable relationship between ESG and ROE, ROA, or stock price, 13% observed a neutral relationship, 21% revealed a mixed effect, and 8% discovered a negative relationship. Instead, the outcome of investment studies, which often focused on risk-adjusted characteristics like alpha or Sharpe ratio on a portfolio of stocks, suggested a 33% positive relationship, a 26% neutral link, a 28% mixed relationship, and a 14% negative relationship[131]. Additionally, Whelan et al., updating 59 studies concerning the relationship between climate change and financial performance, discovered that: on the company side, 57% obtained a positive outcome, 39% neutral, 9% mixed, and 6% negative; on the other side, from an investor's perspective, the 43% got a positive result, the 22% both neutral and mixed, and finally the 13% drew negative results[132]. The outcomes listed above are summarized in Table 29:

[130] Friede, Busch, & Bassen, 2015
[131] Whelan, Atz, Van Holt, Clark, & C.F.A., 2020
[132] Whelan, Atz, Van Holt, Clark, & C.F.A., 2020

Table 29. ESG and Financial Performance Correlation Between 2015 and 2020



Source: Whelan et al. (2020)

The effect of ESG on corporate performance has been interpreted differently over time. An example is an earlier study carried out by Aupperle, Carroll, and Hatfield in 1985 claimed that there is no correlation. Their investigation revealed no connection between social responsibility and profitability[133]. However, in 2015, Kim, Kim, and Qian examined the same relationship using a slightly different methodology. They segmented the companies based on their competitive actions, which is crucial in determining how CSR initiatives affect a company's financial performance. In that study, competitive actions must be interpreted as direct, specific, observable competitive moves to strengthen a firm's competitive position, including the launch of new products, marketing, and capacity growth. The results indicate that aggressive competition and morally righteous behavior are rewarded with improved financial results[134]. Another piece of evidence comes from Alareeni and Hamdan's research, which examined how ESG disclosure affected the financial performance of listed companies in the US S&P 500. They specifically examined if there is a relationship – positive, negative, or natural – between the degree of transparency and companies' operational (ROA), financial (ROE), and market performance (Tobin's Q) using a sample analysis that included 4860 observations from 505 listed corporations. The outcome revealed that ESG disclosure influences a company's performance benchmark favorably[135]. According to the descriptive study, companies with larger financial and asset leverage disclosed more information regarding ESG, social responsibility, the environment, and governance. Additionally, they discovered that companies with higher ESG, or environmental and social responsibility, disclosure levels have higher

[133] Aupperle , Carroll, & Hatfield, 1985
[134] Kim, Kim, & Qian, 2015
[135] Alareeni & Hamdan, 2020

ROA and ROE. In contrast, a low degree of governance transparency is linked to a higher level of ROA. However, the market performance of the company (measured by Tobin's Q) appears to be higher in companies that disclose less about there are social responsibility, environmental impact, and governance[136]. Nevertheless, the results of the regression models imply that ESG disclosure has a significant favorable impact on all the indicators concerning the companies' performance.

In 2021, Mohammad and Wasiuzzaman conducted a similar analysis to examine the impact of ESG disclosure on companies' performance and competitive advantage. The sample used includes 661 publicly traded companies in Malaysia. Their results imply that a company's sustainability efforts could resource management and help to run the business more efficiently. Additionally, the research revealed that ESG disclosure improved shareholder value in Malaysia, hence strengthening the stakeholder theory concerning the positive connection between ESG and company competitiveness. Furthermore, they discovered consistent evidence that a one-level increase in ESG disclosure boosts company performance by nearly 4%[137].

In 2017, Genedy and Sakr examined social and economic factors in the Egyptian market and found additional evidence concerning the link between corporate social responsibility and financial performance. Companies that perform better in terms of accountability have higher ROA, ROE, and EPS ratios. This research demonstrates that adopting robust responsibility practices generated advantages that outweighed the underlying costs[138].

In 2021, Ruan and Liu, in contrast to earlier research, discovered that corporate ESG initiatives had a detrimental influence on corporate performance. According to their study, anytime the ESG rating level rose by one unit, the corporate performance decreased by 4.3%. This study included Chinese companies with A-share listings in Shanghai and Shenzhen. They also reached the conclusion that non-state-owned companies have greater cost pressure in ESG initiatives compared to state-owned corporate, which results in a more significant performance decline. An explanation for this outcome, following Ruan and Liu's reasoning, stems from the fact that public companies in China are still subject to significant cost constraints. They further stated that the influence of ESG rating exhibit discrepancy owing to company type and industry features. When combined with Chinese regulatory authorities and the capital market's situation, this negative correlation may still exist in the future[139].

[136] Alareeni & Hamdan, 2020
[137] Mohammed & Wasiuzzaman, 2021
[138] Genedy & Sakr, 2017
[139] Ruan & Liu, 2021

As already discussed, the majority of the studies on the topic show a positive correlation between ESG and company performance. According to the analysis performed by Whelan et al., six important implications may be taken from the relationship between these factors:

1. ***Over a longer time horizon, the impact of ESG on financial performance becomes increasingly pronounced.***

   According to Whelan et al., the proxy for an indicated long-term relationship had a statistically significant favorable tilt. According to their approach, a study with inferred long-term attention is 76% more likely to yield a favorable or neutral result. Nevertheless, Dorfleitner, Utz, and Wimmer discovered that companies with strong ESG ratings received returns up to 3.8% higher per standard deviation on ESG scores in the medium and long-term[140]. Kotsantonis, Rehnberg, Serafeim, Ward, and Tomlinson found a positive relation between CEO communication of "long-term plans" and the exceptional positive reaction by the stock market[141].

2. ***ESG integration appears to be more effective than negative screening, and ESG momentum may cause innovators to outperform leaders.***

   The study's outcome included three components:

   - A back-test on a hypothetical portfolio of all US cap stocks between 2010 and 2020 revealed that the top-quantile ESG innovators beat bottom-quantile ESG "decliners" by 3.8% annually. The analysis also demonstrated how each outperformance increased for each quantile.
   - A hypothetical ESG improvers portfolio optimized by controlling sector and factor biases would provide a 0.5% annualized excess return with a 1.3% tracking error relative to the Bloomberg US 3000 Index.
   - When combined with standard factors, the ESG innovators factor improved returns throughout the back-test period.

[140] Dorfleitner, Utz, & Wimmer, 2018
[141] Kotsantonis, Rehnberg , Ward, Serafeim, & Tomilnson, 2019

3. ***ESG investing is a tool to reduce risk, particularly in the event of a social or economic disaster.***

   ESG investing appears to offer asymmetric advantages. Indeed, studies have demonstrated a substantial correlation between lower risk linked to sustainability and higher financial performance. In 2019, Fernándeza, Abu-Alkheilb, and Khartabiel compared German mutual funds' performance and risk sensitivities during the financial crisis (2007-2009) with the German socially responsible investments and conventional peers. They discovered that the adjusted returns for the green funds were marginally higher than those of the competitors. The same sample period was used to provide comparable results during the Eurozone sovereign debt crisis (2010-2012). Along these lines, in the first quarter of the 2020 Covid crisis, 24 out of 26 ESG index funds outperformed their conventional peers, demonstrating how ESG can lead to greater resilience[142].

4. ***Corporate sustainability activities may influence financial performance due to components such as increased innovation and improved risk management.***

   The implementation of sustainability policies at the company level may result in improved performance. These methods, which are also known as mediating factors, represent innovation, increased operational effectiveness, and enhanced risk management. Particularly noteworthy is the work of Vishwanathan, Van Oosterhout, Heugens, Duran, and Essen, who conducted a meta-analysis in 2019 to identify the four characteristics that, at best, lead to financial performance. They demonstrated that the improvement of company reputation, the rise in stakeholder reciprocation, the reduction of corporate risk, and the strengthening of innovation capability are the most significant mediating elements[143].

5. ***Studies claim that better management for a low-carbon future enhances financial performance.***

   Whelan et al. argue that research on decarbonization solutions for climate change mitigation is relatively recent. However, there is compelling evidence linking these

[142] Hale, 2020
[143] Vishwanathan, van Oosterhout, Heugens, Duran, & van Essen, 2019

techniques to superior financial performance for both corporations and investors[144]. For instance, Cheema-Fox, LaPerla, Serafeim, Turkington, and Wang's analysis, which developed decarbonization factors, go long on low carbon intensity industries, sectors, or companies and short on high carbon intensity. They claimed that various decarbonization approaches resulted in different risk-adjusted returns. Remarkably, the more the strategies reduce carbon emission, the more they would be effective[145]. According to a comparative analysis conducted on 736 US public companies between 2005 and 2015 by In, Park, and Monk in 2017, a strategy that favors carbon-efficient companies over those that are not could result in an extraordinary return between 3.5 and 5.4%[146].

6. ***ESG transparency alone cannot influence financial performance*.**

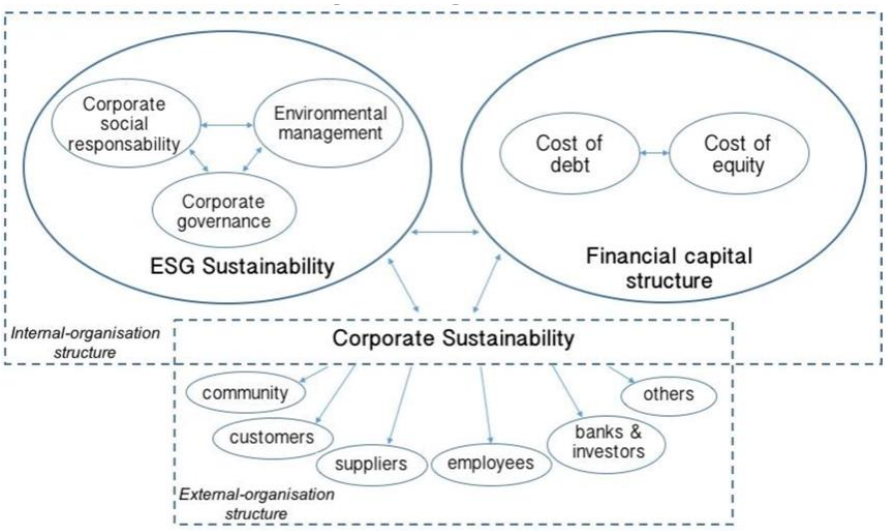
   The research focused exclusively on ESG disclosure has frequently struggled to find a positive link. This indicates that evaluating ESG measures in a vacuum without a clear strategy appears to be counterproductive. The UN PRI signatories are one example of this; they are committed to implementing ESG policies with a particular emphasis on disclosure and performance. In this context, in 2020, Kim and Yoom discovered that after signing, funds typically do not show increases in fund-level ESG scores but do show decreases in portfolio return and alpha[147].

2.4 Are ESG Factors Important in Reducing the Cost of Capital?

Following an examination concerning the relationship between ESG and corporate performance, we will focus on the company's financial capital structure. In other words, whether there is a relationship between sustainability components and the cost of capital. To help focus the content study, Table 30 provides an excellent framework for understanding the relationship between ESG sustainability and the company's financial capital structure:

[144] Whelan, Atz, Van Holt, Clark , & C.F.A., 2020
[145] Cheema-Fox, LaPerla, Serafeim, Turkington, & Wang, 2019
[146] In, Park, & Monk, 2017
[147] Kim & Yoon, 2020

Table 30. The Linkage Between ESG and a Firm's Financial Capital Structure



Source: Devalle, Fiandrino and Cantino (2017)

In Table 30, Devalle, Fiandrino, and Cantino offered a synthetical framework of a company's internal-organization structure in which financial, environmental, social, and governance objectives should be aligned with the goal of going beyond essential profit maximization and improving corporate sustainability while also taking into account the interests of all the stakeholders. On one hand, ESG variables are used as qualitative information in a firm's investing process. On the other hand, the corporate's financial capital structure consists of both equity and debt financing and is used to raise funds to manage and grow the firm. The linkage between ESG sustainability, equity, and debt finance can be defined using the following method[148].

The relationship between ESG and equity cost has been studied over the past ten years. Generally speaking, the literature has come to a uniform conclusion concerning the favorable influence of ESG elements on the cost of equity reduction. It is also crucial to note that, typically, excellent financial performance and high-quality accounting information have a significant impact on the company's cost of equity by changing the investors' assessments of the level of uncertainty around future cash flows, equity, and debt financing[149]. As a proxy for a company's cost of capital, Easly and O'Hara demonstrated how cross-sectional differences in required returns cause information asymmetries between informed and uninformed

[148] Devalle, Fiandrino, & Cantino, 2017
[149] Hou, van Dijk, & Zhang, 2012

investors[150]. Similarly, other studies investigated how non-financial information influences the cost of equity. In this regard, it is noteworthy to draw attention to Ng and Reazee's study, which demonstrated the link between financial and ESG sustainability performance and lower equity cost of capital by identifying five primary causes[151]:

1. Better communication and interaction with all stakeholders are related to improved financial and non-financial sustainability performance.
2. Shareholder wealth maximization cannot be achieved by neglecting ESG risks.
3. The emphasis on ESG sustainability performance aids in the identification of strategic, operational, reputational, compliance, and financial risks that may impact corporate value and performance.
4. In order to demonstrate a long-term commitment to sustainability, companies with more robust sustainability performance are more likely to disclose their financial and non-financial ESG sustainability actions and initiatives to the financial markets.
5. Non-financial ESG components of stainability performance are as significant as financial ones; they present investors with additional risks and opportunities when establishing portfolio investment valuation.

In practice, according to the study carried out by Ng and Reazee, one of the primary reasons follower the cost of capital is the reduction of asymmetric information, which is powered by ESG sustainability performance[152].

In light of the asymmetry in information discussed above, Cohen, Holder-Webb, Nath, & Wood conducted a study and discovered that social capital encourages information sharing within a network, hence minimizing information asymmetries among counterparts. This avoids financial markets' inefficiencies, such as moral hazard and adverse selection[153]. Cuadrado-Ballesteros, Garcia-Sanchez, & Martinez Ferrero validate the importance of information asymmetry as a mediator component in lowering capital costs. Their theory holds that when financial and social transparency quality increases, information asymmetry diminishes, which reduces the cost of capital[154].

[150] Easley & O'hara, 2005
[151] Ng & Rezaee, 2015
[152] Ng & Rezaee, 2015
[153] Cohen, Holder-Webb, Nath, & Wood, 2011
[154] Cuadrado-Ballesteros et al., 2016

This notion corroborated what Ng and Reazee discovered: the more information companies are willing to disclose; as a result, information asymmetry decreases, lowering the company's cost of capital.

Table 31 summarizes the research, sample, time frame, methodology, and findings regarding the relationship between equity cost and ESG. In particular, the research findings are portrayed in the last column as the impact of ESG on increasing/decreasing the cost of equity.

Table 31. The Linkage Between ESG and Cost of Equity

Study	Methodology	Data Collection	Sample	Time period	Findings
(Armitage & Marston, 2007)	Survey Research	16 semi-structured interviews	Finance directors	November 2005 – June 2006	Lower CE
(Borghesi et al., 2014)	Quantitative *(Regression, Fixed Effects)*	KLD Research & Analytics; CRSP/Compustat database	11,711 US companies	1992 - 2006	Lower CE
(Botosan, 2006)	Qualitative				Lower CE
(Crifo & Forget, 2015)	Qualitative				Lower CE
(Cuadrado-Ballesteros et al., 2016)	Quantitative *(multi-regression model)*	Thomson One Analytics; I/B/E/S database	1,260 non-financial listed companies	2007 - 2014	Lower CE
(Dhaliwal et al., 2011)	Quantitative *(logistic regression model)*	KLD STATS, Compustat I/B/E/S database	11,925 CSR Reports	1993 - 2007	Lower CE
(Ferris et al., 2017)	Quantitative *(multi-regression model)*	DataStream; Worldscope; BoardEx database of Management Diagnostic Limited I/B/E/S	37,712 firms across 52 countries	1999 - 2012	Lower CE
(Hung et al., 2013)	Quantitative *(difference-in-differences method with a propensity-scorematched procedure)*	GTA, China Security Market and Accounting Research (CSMAR) database	3,723 firms	2006 - 2010	Lower information asymmetry
(Lins & Servaes, forthcoming)	Quantitative *(difference-in-differences model fixed effect)*	Compustat; MSCI ESG Stats Database	3,000 largest U.S. companies	2008 – 2009	Lower cost of capital
(M. L. Matthiesen & Salzmann, 2013)	Quantitative *(multi-regression model)*	Thomson Reuters ASSET4 database; Institutional Brokers' Estimate System I/B/E/S database; DataStream	3,439 firms in 42 countries	2002 - 2013	Lower cost of capital
(Ng & Rezaee, 2015)	Quantitative *(PCA)*	KLD database, Compustat; CRSP	3,000 firms	1991 - 2013	Lower cost of capital
(Sharfam & Fernando, 2008)	Quantitative *(regression model)*	KLD Stat, Compustat; United States EPA TRI data; Bloomberg Financial Dataset	267 U.S. firms	Risk premium over the period 1872 – 2000	Lower cost of capital
(Reverte, 2012)	Quantitative *(regression model)*	Observatory on Corporate Social Responsibility (OCSR) reports; JCF Quandt database	Spanish listed firms	2003 - 2008	Lower cost of capital
(El Ghoul et al., 2011)	Quantitative *(multivariate regression analysis)*	KLD STATS; Thompson (I/B/E/S); Compustat	12,915 U.S. firms	1992 - 2007	Lower cost of capital

Source: Devalle, Fiandrino and Cantino (2017)

The literature on the relationship between ESG and the cost of debt can be divided into two primary categories: the former focuses on the cost of corporate bonds and bond issues, and the latter on private debt and loans that banks primarily provide. The study by Sharfam and Fernando, which was part of the former category, demonstrated how environmental risk management reduced the company's costs of financial distress and the quality of its debt. In particular, the cost of debt financing used to support a company relies mainly on how the capital

market assesses the corporate's default risk[155]. Furthermore, a company's default risk rate can be viewed as a function of its future activity uncertainty. The greater the uncertainty regarding a company's future activities, the worse the quality of its debt and the higher its cost. According to Sharfam and Fernando, corporates that engage in environmental risk management may lower their exposure to extreme environmental disasters. This improves the company's risk profile in the market, which is rewarded with lower debt capital costs. In general, a corporation that benefits from lower debt costs might increase its level of leverage due to better risk management. As a result, the company increases the amount of money it can protect from taxation[156].

It is also worth noting Ge and Lui's analysis of the relationship between CSR and yield spreads. The findings revealed that a higher CSR strength score is associated with a reduced yield spread in new corporate bond issuance and better credit ratings. This indicates how bondholders value the CRS activity fostered by borrowers[157].

Goss and Roberts, who is study falls into the latter category, investigated the relationship between corporate social responsibility and bank debt using a sample of 3996 loans from US corporations. In general, they contended that the corporate bond market is less efficient than bank loans since banks may handle private information from the beginning of the deal. Nonetheless, the study also claimed that the impact of CSR on spreads demonstrated how banks perceive CSR as a second-order factor of spreads. In general, this means that lenders do not reward CSR investments and do not consider them to be risk mitigators[158].

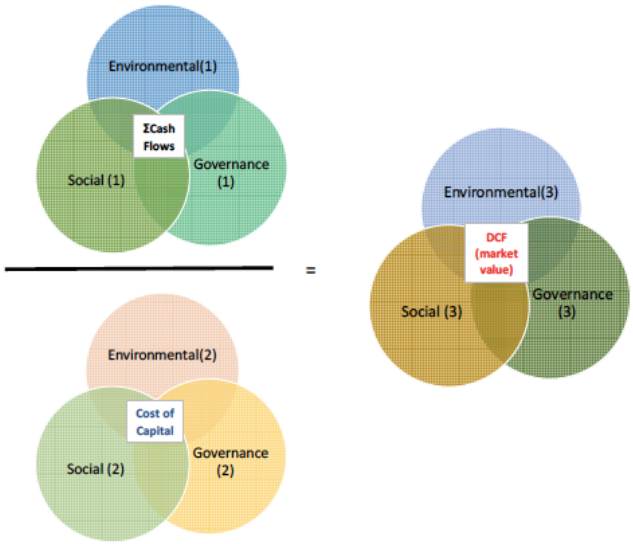
Nandy and Lodh, on the other hand, investigated the link between debt cost and environmental information, focusing on how companies that engage in environmental management activities benefit from more favorable loan contracts from banks due to lower costs. They also noted that, when combined with company-level governance and loan features, the company's environmental responsibility could serve as a good proxy in loan-granting choices[159].

As a result, we have seen how ESG may affect corporations' profitability and cost of capital, with meta-analysis studies showing a positive slant to their impact. Nevertheless, the outcome is contradictory. In 2020, Visconti asserted that ESG elements could have an impact on a firm's valuation: using DCF metrics as an example, ESG factors have an effect on both the numerator and the denominator and, consequently, cash flows and cost of capital. In general, the overall

[155] Sharfman & Fernando, 2008
[156] Sharfman & Fernando, 2008
[157] Ge & Liu, 2015
[158] Goss & Roberts, 201
[159] Nandy & Lodh, 2012

market estimation represented by the total of discounted cash flows is asymmetric, regardless of whether E(1)≠E(2)≠E(3), S(1)≠S(2)≠S(3), and G(1)≠G(2)≠G(3). According to Visconti, this indicates that the same factors affect cash flows, cost of capital, and DCF sum in different ways. The researcher's reasoning appears to be based on the fact that cash flows are an internal parameter. In contrast, capital cost mimics the cash flow discount risk but also incorporates external elements. Furthermore, the impact of ESG may be considered dynamically in the sense that it evolves with time. Table 32 clearly illustrates how ESG affects the two dimensions and, as a result, the potential change in DCF value[160].

Table 32. ESG Impact on Cash Flows, Cost of Capital, and DCF Value



Source: Visconti (2020)

The three major credit rating agencies (Moody's, S&P, and Fitch) have all signed the UN PRI Statement on ESG in credit risk and ratings. As signatories, they have agreed to incorporate ESG into credit ratings and analysis systematically and transparently. For this reason, credit rating agencies evaluate ESG data at the firm level when assessing creditworthiness and establish a clear correlation between ESG data and a corporate's cost of capital. Throughout the analyzed period, MSCI discovered - as portrayed in Table 33 - those corporates with high ESG ratings had reduced average cost of capital compared to firms with low ESG scores in both developed and emerging countries. According to the research, firms with strong ESG

[160] Visconti, 2020

ratings have above-market values and profitability. This is reasonable since a lower cost of capital should boost profitability, which can justify a higher valuation[161].

Table 33. ESG Scores Linked to Corporate's Cost of Capital

Source: Nottingham Advisors (2020)

2.5.1 Credit Risk

Financial risk is defined as the possibility of losing money for any investor who commits to a financial transaction. When money is lent to a party, a specific type of financial risk is known as credit risk. The risk is the likelihood that a borrower or debtor will not be able to pay back the loan or the interest to the creditor. When a borrower fails to repay the debt or the interest to the creditor, causing the creditor to experience financial loss, the situation is referred to as a default. It is important to note that loans can and are made between various financial vehicles, including banks, individuals, companies, and even the government. This sophisticated credit matrix is a key pillar of the financial system; the 2008 credit crisis demonstrates how important credit structures are in the financial system. Since then, academics and institutions have focused more on managing and developing credit risk modeling.

Credit risk can be measured in a variety of ways, including the probability of default (the likelihood that a debtor will default), exposure at default (the outstanding amount if a debtor defaults), and loss given default (the percentage of the outstanding amount lost at default),

[161] Notthing Advisors Asset Management, 2020

among others. Credit rating companies specialize in determining whether a debtor can repay its debts. These companies frequently offer letter grades to summarize credit risk evaluations. For instance, credit ratings could range from AAA (maximum credit risk) to CCC (minimal credit risk)[162].

2.5.2 Credit Default Swaps

Credit Default Swaps are gaining popularity since they are the most liquid credit derivative available on the market; hence, they can give a better market-based proxy for credit risk than the previously mentioned financial measures or credit ratings. The advantage of employing CDS is that their features are standardized, which makes them easily comparable across companies. Due to the instrument's high liquidity, market information (such as ESG scores and news pertaining to a company's sustainability) is more immediately incorporated into price calculation, allowing us to have promptly updated market valuations[163]. There are two approaches to modeling CDS: structural models and reduced-form models. Structural models use a Merton-based methodology employing market data[164]. According to the models, the primary components of credit risk are leverage, volatility, and risk-free term structure. These determinants are frequently employed as control variables in predicting corporate bonds. Furthermore, unlike bond spreads, CDS spreads do not require the risk-free term structure to be specified[165]. The second modeling approach is a reduced-form method, which estimates the dynamics of default probabilities by leveraging market data to retrieve parameters required to value credit-sensitive claims. Reduced-form models have demonstrated their versatility under low volatility circumstances[166] but fail to make the connection to the underlying economic principles. When comparing the two methodologies, it is concluded that structural models outperform reduced-form models in predicting CDS spreads[167].

[162] Rablen, 2013
[163] Finnerty, Miller, & Chen, 2013
[164] Black & Scholes, 1973; Merton, 1974
[165] Han & Zhou, 2015
[166] Houweling & Vorst, 2005
[167] Arora, Bohn, & Zhu, 2005

2.5.3 Relating ESG to CDS

Only a few studies have explored the impact of ESG variables on credit risk using CDS spreads as a proxy for credit risk. The analysis carried out by Hock et al. employs a random-effects panel regression model with a structural CDS approach and a single environmental score to assess sustainability. The research suggests that more sustainable corporates experience lower CDS spreads, thus reducing credit risk. Furthermore, the study does not look at how the impact of ESG on credit risk varies among countries or industries[168].

The research conducted by Razak et al. builds on Hock et al. study by using a country level in the model while still using a comparable random-effects model. The analysis reveals that the influence of ESG scores is not universal, whereas country sustainability and company governance have a substantial impact[169]. A further study carried out by Barth et al. employs fixed-effect regressions and concludes that high ESG scores are associated with reduced CDS spreads and, consequently, lower credit risk. Furthermore, this research does not use a country-level variable but instead divides the data into European and American countries and compares the scores, discovering significant disparities between the two[170].

In conclusion, the findings from all three research are noteworthy. The distinction between countries or industries has only been explored between American and European firms.

2.6 The Merton Model Approach in Analyzing Corporate Performance

One of the crucial milestones in the pricing process of European options was achieved by Black, Scholes, and Merton in the early 1970s. In 1973, academics developed the fundamental approach for valuing stocks and corporate bonds as derivatives of the company's assets. Specifically, Black and Scholes presented a thorough general equilibrium theory of option pricing, which is essential because the final formula is a function of the "observable" variables. It is worth noting that this approach anticipated the application of the capital asset pricing model (CAPM) to determine the link between the market's necessary return on the option and the required return on the stock. The Black and Scholes model was improved and expanded by Merton. The core concept behind these improvements was embodied in creating

[168] Höck, Klein, Laudau, & Zwergel, 2020
[169] Razak, Ibrahim, & Ng, 2020
[170] Barth, Hübel, & Scholz, 2018

a riskless portfolio composed of the option and the underlying stock. The evaluation of the portfolio's return over a brief period must equalize the risk-free return.

Subsequently, in 1974, Merton created a model that utilized stock prices as an input to predict the equilibrium bond spread and the chance of default. The concept is based on a straightforward intuition: a corporate default when its assets' value falls below its liabilities' value. In fact, if a firm's investments supported by banks and bondholders fail to yield predicted cash flows, shareholders incur a loss on the capital they invested in the firm. If the capital value reaches zero, shareholders have already lost everything; thus, under the limited liability concept, they are not compelled to put additional capital in the firm to repay the corporate's debt. In this circumstance, when the first payment to creditors is due, the shareholders would be better off declaring bankruptcy and leaving the firm to the creditors. In actuality, when a company's liabilities exceed its assets, shareholders, according to Merton, have the option of defaulting and leaving the company to its creditors rather than repaying the debt[171].

In general, this model is centered on the corporate's structural characteristics that impact its likelihood of default, thus the value of assets, the value of debt connected to the degree of leverage, and the volatility of asset values.

Consequently, the following assumptions were made in the Merton model in order to get significant insights concerning the determinants of credit spreads[172].

- There are no transaction costs, taxes, or issues linked to asset indivisibility.
- There are enough investors with comparable wealth levels; thus, each investor believes he can purchase and sell as much of an asset as he wants at market value.
- There is a market for borrowing and lending at the same interest rate.
- Short-sale of any asset of every asset is permitted, with full use of the proceeds.
- Asset trading occurs continually throughout time.
- The Modigliani-Miller theorem, which claims that a company's value is independent of its capital structure, holds.
- The Term-Structure is "flat" and well-known. In other words, the price of a riskless discount bond that guarantees a one-dollar payment at time T in the future is P(T)=exp[-rt], where r is the (instantaneous) riskless interest rate that is constant across time.

[171] Resti & Sironi, 2007
[172] Merton, 1974

- A diffusion-type stochastic process with a stochastic differential equation can explain the dynamics for the company's value, V, over time.

These assumptions are optional for the model but are employed for convenience. For instance, the first four assumptions – the "perfect market" ones - can be loosened. Assumption 6 is demonstrated as part of the study, and Assumption 7 is used to differentiate risk structure from term structure effects on pricing. Points 5 and 8 are essential model assumptions that must be considered.

The model simplified a company's capital structure as follows[173]:

- A zero-coupon bond with a face value of F, a maturity date of T, and a total value of D.
- Shares with a total market value of E but no dividend payment.

When the company's asset value (AT) is correlated to the value of debt (DT) and equity (ET) via the accounting equation, that determines that the value of the firm's asset is equal to the sum of debt and equity[174].

$$\boldsymbol{A_T = D_T + E_T} \quad [1]$$

According to Merton, the default can occur only at time T, which corresponds to the debt's maturity. The company may assume two states at this time:

- **Solvency**: A(T) ≥ F; the assets' value exceeds the debt's face value; thus, bondholders are fully repaid, leaving shareholder A(T)-F.
- **Insolvency**: A(T) < F; the value of the assets is less than the face value of the debt; in this circumstance, full repayment of the outstanding debt is not achievable. Debt holders have a claim on the remaining assets for their entire residual value A(T).

The bondholders' payout at time T can be described as follows:

$$D_T = F - [F - A_T, 0 = \min[F, A_T] \quad [2]$$

And for equity holders:

$$E_T = \max[A_T - F, 0] \quad [3]$$

[173] O'Kane, 2008
[174] O'Kane, 2008

The equity payout at time T is comparable to a call option with a strike price equal to the outstanding debt face value F on the asset value. The debt payoff is comparable to holding long positions in F and short positions in put options[175].

The researchers assumed that the company's market value swings in an unforeseeable manner. Merton, in particular, claimed that the firm's asset value (V) could be expressed as the geometric Brownian motion shown below[176].

$$dA = \mu A dt + \sigma A A dW$$

[4]

Thus:

$$\frac{dA(t)}{A(t)} = \mu dt + \sigma_A dW$$

[5]

Where $\frac{dA(t)}{A(t)}$ represents the instantaneous percentage change in V, μ is the predicted instantaneous rate of return on asset A, σ_A is the volatility of the firm asset, and dW is a random disturbance that may also be written as the product of a normally distributed term ε and the square root of time. Thus, [5] may be written as[177]

$$\frac{dA_{(t)}}{A_{(t)}} = \mu dt + \sigma_A dW = \mu dt + \sigma_A \varepsilon \sqrt{dt}$$

[6]

According to the Merton's model, the likelihood of default may be expressed as a function where the asset value at the time of debt maturity (AT) is lower than the repayment value of debt F. In this manner, the solution is[178]:

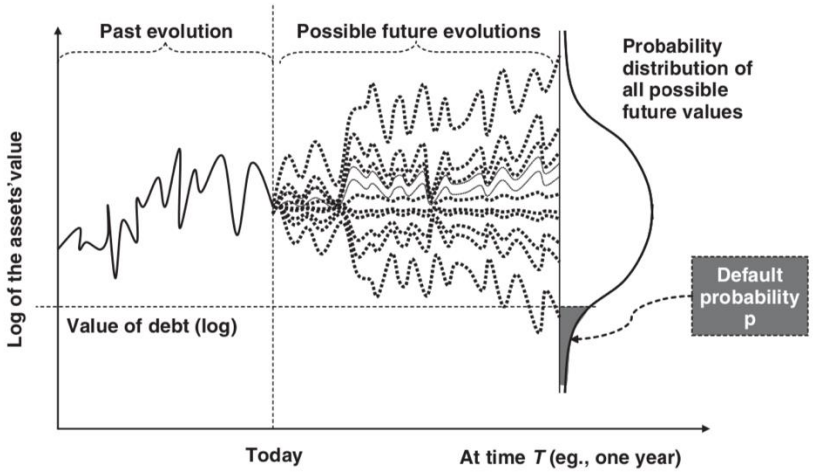
$$A_T = A_0 \cdot e^{\left(\mu - \frac{\sigma^2}{2}\right)T + \sigma_A \sqrt{T} \cdot Z}$$

[7]

According to [1], Merton's model states that the percentage change in asset returns evolves stochastically and that the uncertainty rises as the time horizon becomes longer. Table 34 is a clear illustration of the Merton model's reasoning.

[175] O'Kane, 2008
[176] O'Kane, 2008
[177] Resti & Sironi, 2007
[178] Resti & Sironi, 2007

Table 34. The Reasoning Behind the Merton's Model



Source: Resti & Sironi (2008)

The analysis specifies that $D_{0,}$ $A_{0,}$ and E_0 stand for the three current values of these amounts. The credit risk of a firm is the probability that the value of it is less than the repayment of the debt at T. Especially this likelihood increases as[179]:

- The ratio $D_0/A_{0,}$ e.g., the corporate's debt at time T=0, increased.
- The volatility of the firm's asset return measured by σ_A increased.
- The maturity of the debt increased.

The three factors stated above often account for all the essential information when assessing a company's probability of default, given a specific value in T:

- The company's predicted future cash flows, which contribute to estimating the market value of its asset $A_{0,}$ are influenced by the corporate's perspective, industry, and economy.
- The ratio between assets and liabilities captures the company's financial risk.
- The level of the company risk is implicitly reflected in volatility asset returns.

The probability of default is represented by the area under the normal distribution that reflects all the negative asset returns from A_0 to AT that are less than the debt repayment F. Generally speaking; this area grows as the followings occur:

[179] Resti & Sironi, 2007

⇒ Reduction in the asset's initial market value (A_0).

⇒ Increase in the nominal debt value (F).

⇒ Increase in the volatility of an asset market value (the greater σ_A, the more the distribution is compressed, and the tails thicken).

⇒ Increase in debt maturity.

Starting with [2] and [3], it can be stated that the representation of the payoff to bondholders demonstrates that the latter is short on a put placed on the borrowing company's asset with a strike price equal to F, or the face value of the debt. In addition, it is feasible to observe that the shareholder, thus, the equity holder, owns the company, borrowed at F at time=0, and holds a put option with a strike price of F on the company's asset. As a result, thanks to the put-call parity relation, the company's equity can be stated as a call option on the assets of the borrowing company with a strike price equal to F, the face value of the debt[180]. The present value of the debt and equity can be stated using the widely known Black-Sholes equation as follow[181].

$$P_0 = Fe^{-rT}N(-d_2) - A_0N(-d_1)$$

[8]

$$E_0 = A_0N(-d_1)\, Fe^{-rT}N(-d_2)$$

[9]

Where N(.) is the standard normal cumulative density function, whereas d_1 and d_2 are denoted as[182]:

$$d_1 = \frac{\ln\left(\frac{A_0}{F}\right) + \left(r + \frac{1}{2\sigma_A^2}\right)T}{\sigma_A\sqrt{T}} = \frac{\ln\left(\frac{A_0}{Fe^{-rT}}\right) + \frac{1}{2}\sigma_A^2 T}{\sigma_A\sqrt{T}} = \frac{\frac{1}{2}\sigma_A^2 T + \ln(L)}{\sigma_A\sqrt{T}}$$

[10]

Where L=$\frac{A_0}{Fe^{-rT}}$ is the level of the debtor company's leverage:

$$d_2 = -\frac{\frac{1}{2}\sigma_A^2 T + \ln(L)}{\sigma_A\sqrt{T}} = d_1 - \sigma_A\sqrt{T}$$

[11]

At this stage, D_0 can be derived starting from the position of the debt holder [2] and replacing P_0 [8][183].

[180] Sundaresan, 2013
[181] Resti & Sironi, 2007
[182] Resti & Sironi, 2007
[183] Resti & Sironi, 2007

$$D_0 = Fe^{-rT}[1 - N(-d_2)] + N(-d_1)A_0 = Fe^{-rT}[N(d_2) + \frac{1}{L(-d_1)}$$

[12]

Based on [12], it can be concluded that the loan's value is negatively linked to its leverage and maturity. After analyzing Merton's model, it can be inferred that credit risk is heavily influenced by the company's leverage, the volatility of asset returns, and the debt maturity[184]. Moreover, ESG can transfer stronger and more consistent cash flow into higher asset value of companies, hence the lower the probability of default[185].

[184] Resti & Sironi, 2007
[185] Barth, Hübel, & Scholz, 2018

CHAPTER 3: HOW BANKS ADJUST THE COMPANY'S COST OF CAPITAL: THE AUTOSTRADE PER L'ITALIA CASE

3.1 ESG Risks into Banks

Environmental, social, and governance (ESG) issues, as well as the accompanying opportunities and risks, are becoming increasingly important for financial institutions. For banks, sustainability is not simply an ethical issue; it may soon become an economic and existential one, spawning a new category of risk: Sustainability risk, also known as ESG risk. ESG risks encompass environmental risk, social risk, and governance risk, as well as the influence on banks' profits and liquidity. The unique aspect of the problem pertaining to banks and the banking industry is that ESG risks can have an impact on both the bank directly (i.e., storm damage to bank buildings) as well as the customer (i.e., altered sales opportunities, production delays, etc.), which could result in increased loan default rates. The current focus is on environmental risks and the sub-topic of climate change. Environmental risks are classified as *physical risks* or *transition risks*:

- ***Physical risks*** manifest when damage to borrowers' assets and activities may reduce asset values and consumer creditworthiness, resulting in higher default rates, delinquencies, write-offs, and impairment charges. Furthermore, weather catastrophes may cause physical damage to a bank's premises, resulting in additional costs for the bank.
- ***Transition risks*** occur when changes in stakeholder expectations, policy, law, and regulation may have an impact on the lending operations a bank performs and the value of its financial assets, as well as cause reputational harm if climate risks are not handled.

In addition to the features stated above, two dimensions of ESG risks can be differentiated, a financial dimension and an extra-financial dimension.

- The financial dimension is strongly related to the outside-in effects of ESG, i.e., the implication of external current and forthcoming ESG developments on businesses.

- The extra-financial dimension considers a bank's impact on the environment and society. This tackles the inside-out effect, i.e., the consequences of a bank's actions on environmental or societal issues[186].

3.1.1 Integration of ESG Components into Banks' Risk Management Framework

ESG risk represents a substantial risk driver for most institutions and must be integrated into risk management frameworks at a swift pace. First, it is essential to outline the institution's objectives and ESG strategy. Hence, it is necessary to draw a path to follow in order to design and implement an ESG Risks Framework. Therefore, step 1 is divided into three milestones and states that i) banks must have to be clear about their future positioning, which identifies the client categories and industries in which they wish to operate; ii) banks must consequently consider the design of processes and methods for handling ESG risks early on and act in accordance with the necessity; iii) banks must ensure that ESG risk factors are thoroughly recognized and integrated into all the decision-making processes. Step 2 concerns the definition and the implementation of an ESG Risks Framework, and it is subdivided into four points of interest:

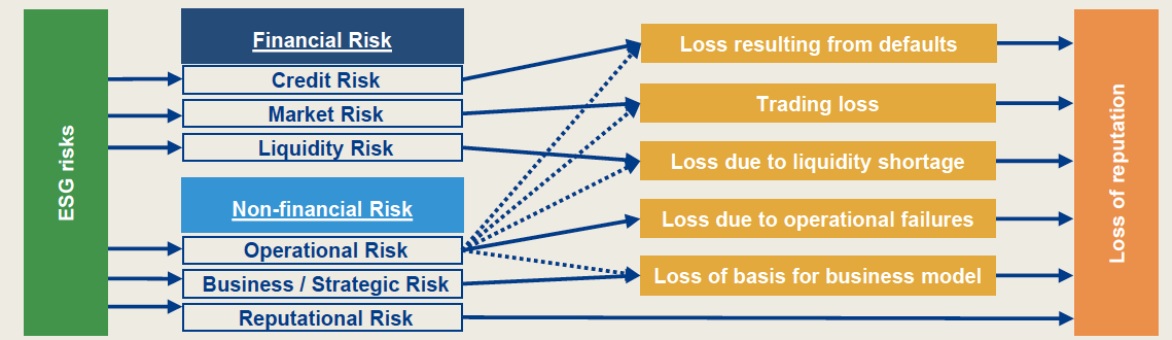
1. ***Governance***: ESG components must be incorporated into the banks' internal governance. One of the first stages toward achieving a good governance foundation is determining who will control the various ESG-related activities and procedures, how reporting and communication will flow, and how the culture will be driven.

2. ***Risk identification/inventory and integration***: to properly incorporate ESG variables into a risk management framework, the firm must first develop an ESG risk taxonomy, beginning with level 1 risks and progressing to include level 2 risks within each ESG risk. Environmental, Social, and Governance criteria are the three main elements that can be used to quantify sustainability. These elements may negatively affect a company's assets, financial and earning condition, or reputation.

[186] KPMG International, 2021

As Table 35 depicts, ESG risks are not considered a separate risk type but rather manifest themselves in other risk types. ESG risks cannot be assessed through a linear approach due to the wide range of linkage between financial and non-financial risks.

Table 35. Elements considered in ESG risk identification



Source: KPMG International (2021)

3. ***Risk assessment, management processes, and tools:*** once the ESG risks for banks' activities have been clearly established in the taxonomy, banks must examine how these ESG risks could materialize in their activities and the repercussions they could cause under several scenarios. Different approaches exist for risk assessment that captures the various characteristics of ESG risks and must be treated as complementary. The following methods are considered in accordance with the EBA's consultive paper on ESG and its integration into risk management.
    - ***Portfolio alignment methods*** consist of defining benchmarks for each sector or portfolio to match portfolios with climate change commitments to align company operations (i.e., lending) with specific climate targets.
    - ***Risk assessment methods*** are the analysis of how several climate-change scenarios influence bank financials intending to understand how adverse climate scenarios could impact the institution's financials.
    - ***Exposure methods*** concentrate on creating heatmaps depicting the concentration exposure to ESG sectors (i.e., green/brown activities) to obtain an overview of the "greenness" of the institution's operations or portfolios.

4. ***Reporting and disclosures:*** Supervisory requirements and guidelines are rapidly changing, and the external reporting process must be flexible to these ongoing changes. Comprehensive initiatives have been developed at global (i.e., Task Force on Climate-

related Financial Disclosure (TCFD), GRI, SASB, IIRC, CDSB, and CDP) and local (i.e., Non-Financial Reporting Directive (NFRD), Taxonomy Regulation, and Sustainable Finance Disclosures Regulation (SFDR)) level. Banks, according to KPMG, should disclose ESG-related information in accordance with the following core components:

- ***Governance & Business Model:*** banks should report how ESG-related variables may affect their business model and strategy, as well as how their operations may have an impact on the environment and society, where such information is relevant.
- ***Policies & Due Diligence:*** the published material should contain the bank's policies on ESG-related concerns, detailing its commitment to those issues and its due diligence processes.
- ***Goals:*** banks should share their perspective on the long-term objectives of their ESG policy. This information should be provided with the intention of assisting the bank's stakeholders in understanding and evaluating the performance of the business model, strategies, policies, and governance structures in place.
- ***Risks & Management:*** banks should be transparent about the ESG-related risks to which they are exposed as well as how those risks are managed and mitigated.
- ***Key Performance Indicators:*** banks ought to make public the metrics and targets employed to evaluate and manage pertinent ESG-related risks. These metrics and targets can be conveyed as indicator-based data.

Nevertheless, the last step consists of creating an ESG Culture risk program that has as its primary objective the involvement of all the stakeholders across the organization[187].

3.2 The Role of Banks in Climate Change

Climate change is increasingly impacting bank business decisions, ranging from key management personnel salaries to the development of new sustainable products. Climate change is considered a systemic risk harming the banking industry. For instance, banks are subject to climate-related risks and opportunities due to their lending and investing activities and their own operations. Banks that make loans to or invest in securities of corporates with direct exposure to climate-related risks (i.e., fossil fuel producers) may accumulate risks

[187] KPMG, 2021

through their loan book and equity holdings. Therefore, banks can play an essential role in shaping and financing a more sustainable future.

KPMG carried out a benchmarking analysis - on a sample of 25 banks - concerning the disclosed climate-related information in the 2020 Annual Financial Report. As a result of the increasing importance gained by climate-change topics in the banking sector, the totality of the sample published climate-related information within the 2020 Annual Financial Report in accordance with the TCFD Recommended Disclosures. Furthermore, in the 2020 Annual Financial Report, 76% of banks revealed details about their climate strategy, including how it fits into their overall business strategy. As part of their climate strategy, the banks highlighted four common areas where they are focusing their efforts:

- ***Reducing financed emissions:*** 15 of the 25 banks stated their strategic objective of lowering the client emissions that they finance by 2050. Several banks emphasized that the first step is to match their financial activities with the Paris Climate Agreement.
- ***Reducing their own operational emissions:*** 20 of the 25 banks claimed that they seek to reduce their own carbon footprint in their operations. Most banks want to achieve net zero emissions from their operation by 2030.
- ***Providing green/sustainable products:*** 22 of the 25 banks have announced their commitment to delivering green or sustainable financial products.
- ***Increasing investment in climate solutions, innovation, and technology:*** 15 of the 25 banks have acknowledged investing in innovative climate solutions and innovations, such as natural resource investments, clean technologies, and sustainable infrastructures. Nevertheless, certain banks have also invested in sustainable start-ups, participated in philanthropic climate projects, and established partnerships with other corporations to assist with climate solutions.

Climate-related financing is a developing industry, and banks capitalize on the opportunity. For instance, 84% of the banks in the sample provided information about the varieties of green/sustainable finance products they are offering to customers:

- ***Green bonds***: in 2020, green bonds were issued by 19 of 25 banks. These pertain to bond issuances for which the revenues are used to fund “green” projects, such as mortgages on energy-efficient homes, or for which the underlying assets are “green.”

These include banks issuing their own green bonds as well as supporting their clients in issuing bonds.

- ***Green deposits***: these products are offered by 5 of the 25 banks. These are deposits where the proceeds are used to fund environmental projects.
- ***Green loans***: customers can get green loans from 13 of the 25 institutions. These are loans that provide favorable or reduced interest rates to consumers who engage in "green" businesses/projects or who purchase properties with specified energy efficiency ratings.
- ***Sustainable funds***: 9 out of 25 banks offer sustainable funds for investors. These funds are established primarily to invest in environmentally friendly and sustainable projects, i.e., renewable energy.

These financing tools could impact banks' accounting and disclosure practices and the recognition of new financial instruments. For instance, green loans could have clauses linking contractual cash flows to achieving climate-related objectives, which could change how the loan is categorized and measured.

The 2020 reports demonstrate that financial institutions are beginning to consider climate risk as a "business as usual" risk on par with other conventional risks. Indeed, several banks revealed that they had integrated climate risk into their overall risk management framework and the beginning to follow the "standard" processes of identifying, assessing, managing and reporting climate risk.

Climate-related risks may have an impact on bank lending activities as well as credit risk. The consequences of climate change, in particular, may increase losses in sectors that are vulnerable to the effects of climate change, resulting in an increase in defaults by borrowers in these sectors and more outstanding credit loss charges for banks while diminishing the value of the collateral. 48% of banks reported that they have already begun incorporating climate-related risks into their borrowers' credit assessments. The following are some examples.

- Including mandatory requirements as part of the credit policy to include climate risk for new lending facilities.
- Using capabilities to estimate financed emissions and emission intensities for high emitting sectors in order to control climate-related loan exposure.
- Detailed due diligence questionnaire prepared for borrowers in high emitting sectors, which is intended to evaluate their performance on various environmental issues.

- Credit due diligence must include using a climate change risk evaluation methodology.

As shown in Table 36, banks have identified the following sectors as being at heightened risk from the effects of climate change. Furthermore, by 2050, 44% of banks stated their intention to cease lending to thermal coal-related activities.

Table 36. Sectors Mostly Impacted by Climate Change

Commercial banking:	Retail banking:
• Commercial real estate • Automotive • Agriculture • Power utilities • Agriculture • Construction • Oil and gas • Airlines • Chemicals • Mining and metals	• Residential mortgages • Motor finance

Source: KPMG (2021)

The banks identified two main climate-related risks for residential mortgages: i) the physical risk associated with possible property damage from weather occurrences like floods; and ii) the transition risk associated with the energy efficiency of properties.

Climate change presents both opportunities and risks for banks – the metrics and targets that banks use to focus on exploiting opportunities while also controlling risks. Banks have revealed metrics and targets in three areas:

- ***Sustainable financing:*** it is defined as funding committed to projects, companies, and goods that help the environment (e.g., the development of renewable energy sources)
- ***Operational emissions:*** banks are also targeting to achieve net zero operational emissions by 2030 (or sooner), with 68% disclosing metrics and targets for carbon emissions and 56% disclosing metrics and targets for energy emissions.
- ***Financed emissions*** are absolute greenhouse gas (GHG) emissions financed by banks through lending and investing activities.

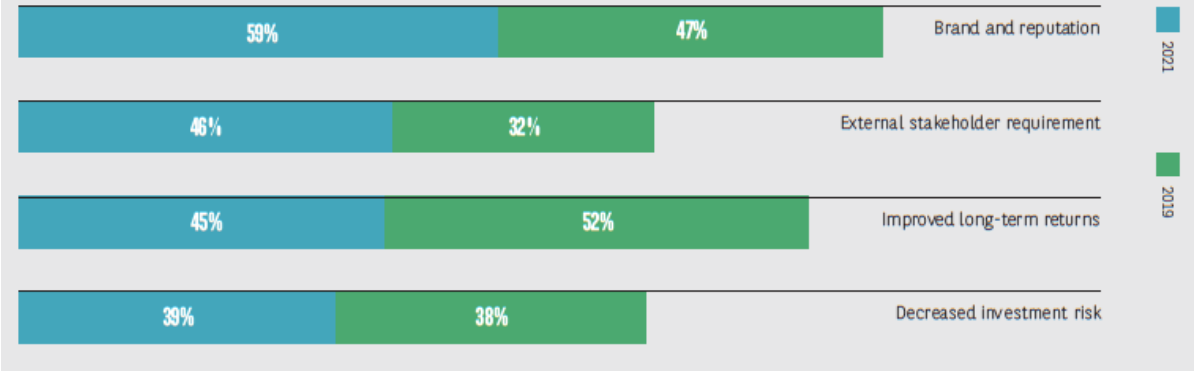
There is currently no globally agreed framework or methodology for defining and calculating climate-related metrics and targets; therefore, practice varies[188].

Between 2017 and 2021, BNP carried out research concerning the difficulties of assessing and integrating ESG factors into investment analysis. The outcome depicts that institutional investors place much emphasis on the issue of climate change, in part because organizations view the incorporation of E elements as a way to stand out from the competition and demonstrate leadership. Since the beginning of the study in 2017, a constant theme has been the propensity for the E in ESG to dominate the discussion. The analysis has repeatedly shown that analyzing and interpreting environmental factors is easier than analyzing and integrating social factors. As of 2021, this still holds true, as slightly over half (51%) of respondents named social as the most challenging factor to evaluate and include in investment analysis, followed by environmental (39%) and corporate governance (27%).

Table 38 portrays the main drivers of the incorporation of ESG factors into the investment decision-making process. Reputation emerges as a key motivator for implementing ESG. This tendency is especially noticeable among asset owners, with 65% citing reputation as a key driver. This figure jumps to 67% for official institutions and public pension funds, which may be more vulnerable to public scrutiny. Institutional investors have kept their focus on returns. Instead, the evidence suggests that they are attempting to limit risks by investing in companies that share their ideals around ESG integration while still providing financial benefits. Investors want to recruit clients. Therefore, stakeholder expectations have grown in relevance. ESG investment grew at the grassroots level due to final-end investors inquiring about where their money is being invested. They want to know how the risk of climate change is accounted for in their investment portfolio and whether the values of the corporates in which they choose to invest are compatible with their own[189].

[188] KPMG, 2021
[189] BNP PARIBAS, 2021

Table 37. ESG Drivers



Source: BNP (2021)

3.3 Sustainability Linked Lending

Sustainability Linked Lending (SLL) is any loan or bond instrument that incentivizes the borrower to meet ambitious, specified sustainability performance targets (SPTs). In contrast to Green Loans or Bonds, where the emphasis is on the use of proceeds (applied solely to Green Projects), SLL focuses on the borrower and its long-term adherence to and development of ESG standards. SLL provides borrowers with more than just liquidity; those who prioritize ESG factors in their company can increase their creditworthiness. SLLs may be the cornerstone of an investor's investment strategy (or even a necessity for some). It may boost returns on investment – they help establish relationships with stakeholders in the fields in which they and their borrowers operate. SLL provides a positive reputational impact and enhances brand recognition for both parties while also contributing to raising awareness and commitment to long-term sustainable growth, diversity and inclusivity, and environmental protection. However, many of the rewards of these benefits can take a long time to materialize for the parties involved. Furthermore, these longer-term benefits are supplemented by the immediate gains that can be realized by implementing an ESG-linked interest margin ratchet ("ESG Margin Ratchet")[190].

Margin ratchets are provisions that link the interest rate to the borrower's operational success. The interest charged on any loan is decreased by a pre-agreed number of basis points in a classic leveraged facility margin ratchet if the borrower can demonstrate that: i) no Event

[190] Wilkinson, O'Grady, Lovie, Bierwirth, & Butchart, 2021

of Default has happened and is ongoing, and ii) the debt-to-earnings ratio falls within a set threshold. In addition to such measures, many SLLs have ESG Margin Ratchets. These provide additional interest rate reductions and/or increases (when applicable) based on the borrower's performance against pre-agreed ESG-related standards and targets[191].

3.3.2 Application, Testing Frequency, and Pricing

Although SLL is becoming more widespread, it is still in its early stage. An industry standard for margin reduction levels, testing frequency, and ESG criteria and targets have yet to develop. However, the trends and terms revealed by the European leveraged loan market to date indicate that if the borrower can demonstrate that: i) no Event of Default has occurred and is continuing, and ii) it has reached a certain number of ESG criteria and/or targets, the ESG Margin Ratchet will apply, and the borrower will benefit from a lower interest rate. In the bond market, ESG Margin Ratchets (which sometimes take the form of premiums payable upon maturity or early redemption) will impose a penalty upon failing to fulfill specified ESG criteria and/or targets rather than a potential reduction in interest rate upon success. Borrowers and investors appear to have agreed to verify ESG performance in loans once a year, with the ESG Margin Ratchet changing yearly based on the ESG annual compliance certificate. In contrast, a leveraged facility margin ratchet is typically adjusted quarterly based on the borrower's performance during that period.

Bonds are often at the opposite end of the spectrum, with only one testing and step-up date (generally around halfway to maturity), after which the ESG-Margin Ratchet either applies or does not. In bonds, especially where the make-whole premium applies until maturity, this can be quite onerous for the borrower because a missed target will permanently increase the cost of borrowing until maturity or early redemption.

Current pricing trends imply that an ESG Margin Ratchet tends to impact interest rates by 5 to 15 basis points per increment. A leveraged facility margin ratchet typically decreases by 10 to 50 basis points per step down. The rationale for a more cautious ESG Margin Ratchet could be that ESG terms are still in their early life, and neither borrower nor investor is willing to commit to a major effect on interest based on terms that have not been sufficiently tested and scrutinized in practice.

[191] Wilkinson, O'Grady, Lovie, Bierwirth, & Butchart, 2021

It should be noted that the ESG Margin Ratchet is a mechanism used to incentivize borrowers to attain and then maintain a defined ESG standard, particularly in the loan market, where it is evaluated on an annual basis. As a result, a borrower should not only aim to fulfill its ESG criteria and, consequently, a lower interest rate but also ensure that the interest rate stays the same by not letting those standards slip. Therefore, in many loan deals, when the borrower falls short of those standards, the ESG Margin Ratchet acts as a two-way system: i) allowing the investor to increase the margin, ii) exerting pressure on the borrower to correct course in order to accomplish its ESG targets and decrease the interest.

As an aside, it has not been considered the failure to satisfy ESG targets alone as generating a Default or an Event of Default because the provisions have been presented as collaborative incentives to achieve a shared objective of borrowers and investors to enhance the contribution financing makes to the broader issues and concerns underpinning ESG targets. However, it must be considered whether failure to meet ESG targets will ultimately result in a Default or an Event of Default trigger. To that end, investors should assess not only the repercussions of a borrower failing to accomplish its ESG targets but also whether incorrect reporting of ESG performance would constitute a breach – whether additional rights should be available to lenders in those cases[192].

3.3.3 Sustainability Performance Targets and Key Performance Indicators

A borrower's ESG performance is assessed in two ways for the purpose of SLL. The most common is by employing predefined SPTs (especially in the bond market). The alternative method is to acquire a Third Party ESG Rating against which all future performance is evaluated.

SPTs should: i) be clearly identified in loan documents; ii) have specific and transparent metrics against which they can be monitored; and iii) cover two to five significant ESG performance outcomes (in each case, as agreed between the borrower and investor). Furthermore, SPTs should be challenging and ambitious targets that not only address and are compatible with the borrower's strategy and primary commercial and sustainability targets, but also the industry sector in which the borrower operates. Testing such SPTs and second-party

[192] Wilkinson, O'Grady, Lovie, Bierwirth, & Butchart, 2021

opinions are crucial components of the sustainability frameworks put in place at the initial loan/bond issuance time and are critical to the transparency required to protect investors.
Borrowers must approach SPTs with honesty and accuracy, as well as a genuine commitment to improving ESG standards. As a result, producing loose-fitting targets is insufficient, nor is it acceptable to settle on targets that are not: i) adequately supported by the promotion of ESG criteria; and ii) indicative of sustainability objectives within a borrower's industry. As a matter of fact, SPTs must be genuine and not represent hidden intentions (so-called Greenwashing) in order to boost a marketing strategy or increase revenues while making no tangible progress toward enhancing ESG standards. For example, a borrower in the vehicle business may consider a legitimate SPT the reduction of CO_2 emissions by a predetermined percentage each year. On the other hand, encouraging guests to reuse towels to reduce a hotel's carbon footprint would not be deemed a legitimate SPT if it concealed a strategy to minimize overheads. Hence, in the automobile's case, the SPT is clearly fundamental to the borrower's industry and sustainability goals. The extent to which the borrower fulfills its SPTs is generally determined by Key Performance Indicators (KPIs), and external third-party verification is usually necessary. In the case of automobiles, an applicable KPI could be the percentage reduction in emission across a sample of vehicles in one year compared to the previous one[193].

3.3.4 Ratchet Application

Suppose the ESG Rating on the testing date demonstrates an appropriate improvement (as indicated in the documentation) over the benchmark rating. In that case, the ESG target is deemed met, and the ESG Margin Ratchet applies.
The ESG Margin Ratchet shall apply under the SPT method if the borrower can prove that a pre-agreed number of KPIs are equal to or exceed their corresponding SPTs. If only one KPI equals or surpasses its related SPT, the ESG Margin Ratchet remains stationary. If no KPIs are equal to or greater than the relevant SPTs, the ESG Margin Ratchet will tend to go the other way and place a premium on the margin. Failure to accomplish each SPT will often result in an increased rate based on the ESG Margin Ratchet, whereas achieving all SPTs will keep the interest rate at the base level. If three SPTs are being tested, failing to satisfy one of them may result in a 15bps increase in the yearly rate of interest for each SPT not met; hence, the highest

[193] Wilkinson, O'Grady, Lovie, Bierwirth, & Butchart, 2021

increase (if all three SPTs were not fulfilled) would be a 45bps increase in the interest rate, but meeting all three SPTs would not affect the interest rate[194].

3.3.5 Reinvestment Obligations

Borrowers willing to enhance their ESG commitments may agree to a hybrid Green Loans method in which they reinvest any savings gained from the ESG Margin Ratchet towards projects, charity, or initiatives. This obligation may be placed on the borrower; however, widespread market acceptance of such obligations has yet to be demonstrated. Those that accept reinvestment obligations should consider caveating them with "reasonableness" or "reasonable endeavors" and ensure that the terms are broad enough to allow reinvestment in various initiatives. On the other hand, investors should ensure that the wording is sufficiently prescriptive to prevent the borrower from escaping and maintaining the resources for a non-ESG purpose. Regardless of whatever side of the table sits on, any reinvestment provisions must be sufficiently appealing to borrowers in order to incentivize them to satisfy the qualifying ESG criteria/targets. Given the limited incorporation of these provisions to date, it is unclear what penalties borrowers can expect if they fail to meet their reinvestment requirements. Hypothetically, a suitable structure could be to align these reinvestment conditions with those similar to standard mid-market mandated prepayment terms, such that any savings must be promised to be applied within 12 or 18 months and actually utilized within 18 or 24 months. If these timescales are not met, ESG savings could be directed to either: i) loan prepayment; or ii) an ESG initiative as the investor may otherwise specify[195].

3.4 Overview of the Autostrade per l'Italia Case

Autostrade per l'Italia (ASPI) is one of the leading European concessionaires for the construction and management of toll motorways, with around 3000 km of network management in Italy. In 2020, ASPI put in place a Transformation Plan in which the cornerstone is represented by sustainability, which is aligned with the Sustainable Development Goals (SDGs) of the UN Agenda 2030. The sustainable transformation plan incorporates all sectors of the company and all stakeholders in a process that includes: i)

[194] Wilkinson, O'Grady, Lovie, Bierwirth, & Butchart, 2021
[195] Wilkinson, O'Grady, Lovie, Bierwirth, & Butchart, 2021

integrated infrastructure management, strengthening resilience and security; ii) the reduction of ASPI environmental impact with the goal of Net Zero by 2050; iii) the enhancement of the sustainability governance system and create a community of individuals that value diversity and talent, iv) the establishment an enhanced relationship with the customer.

ASPI defined eight core projects in this Transformation Plan that concern all three ESG components to integrate sustainability throughout the Group transversally.

- ***" Net Zero" objective:*** ASPI has established a Net Zero approach in accordance with the UN 2030 Agenda by defining emissions reduction targets to limit global warming to 1.5°C by 2050. This strategy places the Group at the forefront of the corporations that have committed explicitly to tackle climate change.
- ***Green Island:*** Autostrade per l'Italia opted to concentrate on producing renewable energy by utilizing the capillarity of the motorway axis. The Green Island project currently envisages doubling the existing photovoltaic plants to reach over 300 in total. The project will have the task of creating a technological solution for the production and sale of energy from renewable sources.
- ***Electric mobility: plan for electric recharges and replacement of the company car fleet:*** through the subsidiary Free To X, one of the most extensive European networks of high-power charging stations for electric vehicles, is in the process of being built. The plan covers 100 Service Areas with 4 or 6 high-power multi-client recharging points (at least 300kW) with average recharging times of 15/20 minutes. Furthermore, the project was launched to replace part of the company vehicles with electric/hybrid vehicles and the construction of charging stations at the company departments and maintenance posts.
- ***Energy efficiency of tunnel lighting:*** the energy efficiency initiative is currently underway in 450 tunnels, where current lighting fixtures will be replaced with LED technology, allowing for saving of roughly 10 GWh/year by 2024.
- ***Reforestation:*** As part of the attempts to reduce CO_2 emissions, a project was also launched to redevelop concession areas through reforestation to improve the landscape, air quality, and CO_2 absorption. A total of 94 sites covering around 150 hectares were identified, and native plants were encouraged to be used there to hasten their growth.
- ***Sustainable supply chain:*** in 2021, ASPI laid down the groundwork for a new sustainable supply chain model by adopting the Open-es digital platform, which would

allow it to analyze all suppliers from an ESG standpoint, assuring compliance with these standards throughout the whole contract cycle life, and fostering communication and engagement with them.

- ***Sustainable infrastructure:*** designing, building, and managing sustainable infrastructures entails striking a balance between environmental protection, economic development, and community well-being. As part of the Company's Investment Plan, the Bologna Passante was the first motorway project in Europe to undergo the Envision certification process. Envision certification evaluates a project's impact on quality of life, resource allocation, environmental impact, and climate risk management. The certification will be extended to the Gronda di Genova in 2023.
- ***The dialogue with the community:*** at every level of its operation, ASPI maintains constant contact with the community and interacts with central and local organizations. In this framework, the debate of new works, systematic participation in Environmental Observatories, and technical and control committees are inserted. The social presence is also substantial, with activities aimed at boosting social welfare and supporting the most vulnerable segments of the community, such as through contributing to attempts to overcome the digital gap. Conversely, there is room within the local policy framework for projects that promote and develop cultural and landscape quality[196].

3.4.1 ASPI ESG Risk Rating

In February 2022, Moody's ESG Solutions awarded Autostrade per l'Italia an A2 ("Robust") Sustainability Rating, confirming the company's outstanding efforts and capacity for implementing ESG factors into its strategy and operations. The Sustainability Rating is backed by a variety of reasons, including expenditures worth €6.2 billion between 2020 and 2024 that will result in a major upgrade of the approximately 3,000 km motorway network managed by ASPI, paving the way to reduce its environmental consequences in terms of emissions, noise, and light pollution. The aforementioned projects are considered the key drivers of Moody's ESG Solutions rating assignment. In particular, ASPI intends to install 100 fast-charging stations for electric vehicles along the highway network for a total investment of €70 million, and the Group's project concerning the generation of renewable energy through the installation of photovoltaic panels alongside the network. Furthermore, Autostrade per

[196] Autostrade per l'Italia, 2021

l'Italia received the top ratings in the "Social" and "Human Capital" areas, where the corporate has successfully accomplished significant objectives[197].

In June 2022, Autostrade per l'Italia received from the Morning agency Sustainalytics an ESG Risk Rating of 6.2 points, which is considered "Negligible." This score places ASPI first in the transportation infrastructure sector and among the top twenty of the more than 14,000 companies evaluated globally. ASPI voluntarily submitted to Sustainalytics review in order to be transparent with its stakeholders; the score received validates the tangible execution of the Group's sustainability strategy and the outcomes achieved in the environmental, social, and governance areas. Nevertheless, Sustainalytics examines "Exposure," which defines the extent to which a corporation is exposed to different material ESG issues. The "Exposure" score considers company- and subindustry-specific elements, including the business model. Sustainalytics assigned Autostrade per l'Italia a low "Exposure" score. Moreover, Sustainalytics evaluates "Management," which refers to how effectively a company manages its relevant ESG issues. The strength of a company's ESG programs, practices, and policies is measured by the "Management" score. The rating agency awarded ASPI's Management of ESG Material Risk with a strong score[198].

3.4.2 ASPI's Sustainability Plan

For ASPI, sustainability is a crucial strategic component. As part of a broader strategy to promote a more sustainable mobility platform, ASPI is prepared to help shape mobility's future by offering more secure and connected infrastructures. ASPI firmly believes that moving along a sustainable path entail having a long-term and holistic perspective of the company's purpose. ASPI is fully conscious of its operations' influence on communities and territories. Therefore, ASPI put in place a sustainability plan that covers all three ESG factors, and it is based on a robust governance model. For instance, the Company's commitment includes:

- ***Environmental***:
    - Decarbonize the ASPI Group by zeroing its carbon footprint through an SBTi approach.

[197] Autostrade per l'Italia, 2022
[198] Sustainalytics, 2022

- Reducing the environmental impacts resulting from infrastructure construction and management.

➢ ***Social***:

- Leading the design, development, and management of a safe, sustainable and resilient network.
- Strengthening HR strategies by focusing on diversity, justice, inclusion, and development.
- Contributing to the social well-being of the communities in which the Group operates.

➢ ***Governance***:

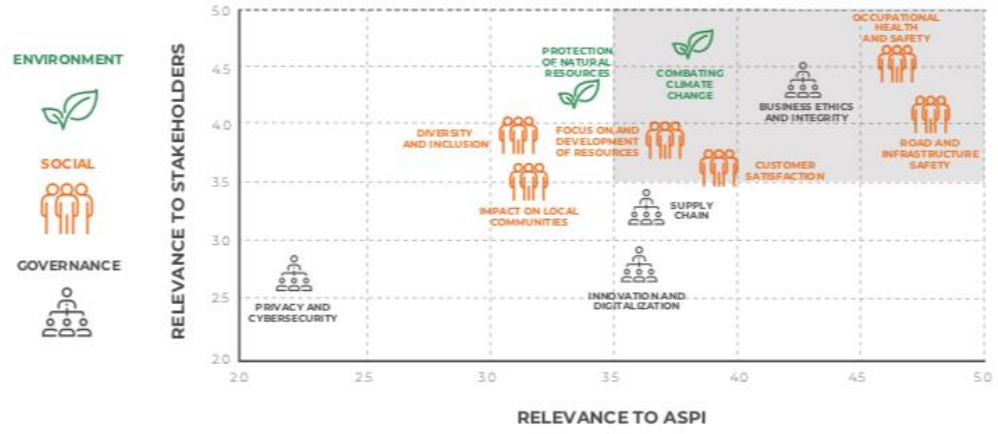
- Guaranteeing full integration of the ESG principles in the company business model and through the value chain.

The Board of Directors' approval of the Materiality Analysis is a crucial milestone in ASPI Sustainability Plan. The strategy fits perfectly into the Industrial Plan of the Group and is in accordance with the national objectives for a green transition.

According to GRI and SASB reporting standards, a materiality assessment is a crucial procedure for identifying issues that reflect the company's most substantial economic, environmental, and social repercussions, as well as those that profoundly influence the judgments and decisions of its major stakeholders.

ASPI concluded its materiality study and identified 12 material topics: two environmental, six social, and four governance-related. Table 38 portrays the 2021 materiality matrix[199].

Table 38. ASPI Materiality Matrix



Source: Autostrade per l'Italia (2022)

[199] Autostrade per l'Italia, 2022

3.4.3 Selection of Key Performance Indicators (KPIs)

UniCredit, in accordance with ASPI, has identified three Key Performance Indicators – namely, sustainable mobility, gender diversity, and road safety- and the relative SPTs. All financing instruments issued under this Framework will include a sustainability-linked component in the cost of debt, resulting in either a coupon or margin adjustment or a premium payment at maturity. If ASPI fails to comply with the predefined SPTs at the observation date, a "financial penalty" will be imposed, resulting in an increase in the interest rate applicable to the interest periods after such reference date.

KPI#1: *Direct GHG emissions (Scope 1) and indirect GHG emissions from energy consumption (Scope 2) calculated as tons of carbon dioxide equivalent (tCO_2 eq).*
Direct (Scope 1) and indirect (Scope 2) GHG emissions are computed in accordance with i) the Global Reporting Initiative Sustainability Reporting Standards issued by GRI and ii) the Greenhouse Gas Protocol (GHG Protocol). The following are the primary operations and activities covered by the Group's Scope 1 and Scope 2 GHG inventory:

Scope 1:

- ***Mobile Combustion***: emissions from owned and rented vehicles, both on and off the road;
- ***Stationary Combustion***: emissions related to i) material manufacturing/processing (specifically, emissions linked to facilities dedicated to the production of bituminous conglomerate) and ii) heat generation (i.e., emissions associated with the combustion of fuels in stationary boilers).

Scope 2:

- ***Purchased Electric Energy***: emissions related to electricity production purchased for daily use.

The calibration of Autostrade per l'Italia's Sustainability Performance Targets is based on the SBTi's decarbonization trajectory, which validates ASPI's 2030 targets. ASPI understands the need to introduce intermediate milestones to promote consistency and indicate continual improvement. As a result, ASPI has chosen to include interim decarbonization targets as SPTs measured in tons of CO_2.

SPT#1:

- **40%** reduction of absolute Scope 1 and 2 GHG emissions in **2025** (versus a 2019 base year);
- **50%** reduction of absolute Scope 1 and 2 GHG emissions in **2027** (versus a 2019 base year);
- **68%** reduction of absolute Scope 1 and 2 GHG emissions in **2030** (versus a 2019 base year).

Autostrade per l'Italia has committed to addressing climate change and limiting global warming to less than 1.5°C by 2050. The Group's Net Zero pledge displays an unusually high commitment for a highway infrastructure operator. Following its decarbonization trajectory, ASPI has designed an SPT#1 fully compatible with the Paris Agreement and applicable SBTi published methodology (1.5°C scenario). To fulfill SPT#1, ASPI is carrying out the following projects and actions:

Scope 1:

- Progressive replacement of the company fleet with models with lower environmental impact, such as hybrid/electric vehicles. The installation of EV charging stations at the main and branch offices;
- Diesel-free project: gradual replacement of diesel-powered boilers with new systems that utilize heat pumps and/or low-emission energy carriers like methane or LPG.
- LNG pilot project: substitution of low-sulfur fuel (BTZ) with LNG (Liquified Natural Gas) to power Amplia infrastructures conglomerate production plant.

Scope 2:

- Energy efficiency initiatives: the replacement of permanent lighting with LED lighting at the toll stations and in the tunnels (c.a. 450 tunnels), strengthening of the Energy management system, initiatives to reduce the energy consumption of plants and buildings;
- All ASPI electricity supply contracts will be sourced by renewable energy plants by 2023;

- Installation of photovoltaic (PV) systems along the highway network to fulfill all of ASPI's energy requirements from internal sources[200].

KPI#2: *Share of women in management (considering a baseline value in 2019 of 20%)*

The rationale behind the second KPI is that ASPI believes it is crucial to attract and retain a diverse workforce and build high-performing leadership teams. It reckons gender diversity is a business imperative for greater engagement, performance, and innovation. Furthermore, because ASPI operates in a traditionally male-operated sector requiring primarily engineering skills, the gender diversity objective remains a key challenge for Autostrade per l'Italia.

The methodology used for calculating this KPI is the weighted ratio of women in management positions, defined as the first and second levels under the CEO (at the company level, these positions account for about 70 places).

UniCredit and ASPI agreed upon the SPTs the company would have to fulfill at the detection date to gain the margin adjustment.

SPT#2:

- **27.5%** share of women in management by **2023** (assuming a baseline value in 2019 of 20%)
- **30%** share of women in management by **2024** (assuming a baseline value in 2019 of 20%)
- **32%** share of women in management by **2025** (assuming a baseline value in 2019 of 20%)
- **32.5%** share of women in management by **2026** (assuming a baseline value in 2019 of 20%)

To achieve the following targets, ASPI has put in place the following initiatives and actions:

- Support women with Welfare programs to improve work-life balance;
- Development of programs and succession plans to increase women in the first and second line of management;
- Mentoring plans and inspirational programs for (female) students to be inspired by ASPI business.

These represent ambitious targets since the majority of the managerial positions within ASPI mainly require an engineering background; the ambition for gender diversity needs to be compared to the number of available graduate engineers women available on the Italian labor

[200] UniCredit, 2022

market. For instance, the share of women graduating in Engineering was 25% in 2017. Furthermore, ASPI's target of 32.5% of women in management is above national indicators[201].

KPI#3: *Accident rate (considering a baseline value in 2019 of 29.8)*

The rationale behind this KPI resides in the fact that the motorway infrastructure sector is highly exposed to safety due to the potentially harmful and irremediable impacts on people's lives and the health of road accidents. Furthermore, as a leading European concessionaire for toll motorway construction and management, ASPI plays a key role in ensuring road safety for its users.

The methodology employed for the calculation of the third KPI revolves around a 3-year rolling average of the global number of accidents per 100 million km traveled, excluding years (such as 2020 and 2021) where kilometers traveled on the ASPI was below 45 bn of km traveled which is the threshold under which the saturation of the network is much lower than normal saturation (where reduction of accidents is more due to exogenous events rather than ASPI actions).

ASPI laid down Sustainability Performance Targets to be achieved between 2022 and 2026 to fulfill the KPI.

SPT#3:

- **29.6** accident rate by **2022** (considering a baseline value in 2019 of 29.8);
- **29.4** accident rate by **2023** (considering a baseline value in 2019 of 29.8);
- **29.2** accident rate by **2024** (considering a baseline value in 2019 of 29.8);
- **29.1** accident rate by **2025** (considering a baseline value in 2019 of 29.8);
- **29** accident rate by **2026** (considering a baseline value in 2019 of 29.8).

The fulfillment of KPI#3 is conditioned in the sense that ASPI agreed to allow a third-party consultant(s) to carry out, at least once a year, an inspection of each of ASPI's structures (i.e., bridges, viaducts, overpasses, and tunnels). These inspections will be performed by the third-party consultant(s) whom ASPI will select through public tenders. It has to be underlined that KPI#3 may only be considered as achieved upon the fulfillment of the above condition, based on the reporting about the inspections carried out in a specific year to be submitted to the Agent.

To be aligned with the aforementioned SPTs, ASPI put in place a structural revolution in the network's care, management, and maintenance systems achieved by employing a thorough

[201] UniCredit, 2022

renovation of the company and the implementation of new standards at the national level for the medium- to long-term management of the infrastructure. Since statically heavy vehicles would be more involved in accidents: i) ASPI will perform in collaboration with the highway police more frequent checks on Heavy Good Vehicles (HGVs); ii) and plans the installation of new scales to check the load bearing of HGVs. Furthermore, the Group will install speed checks near road construction sites and is working on the enlargement of the network's coverage by Tutor portals – which measure the average speed on a stretch – from the current 1,300 km to c.a. 2,500 km.

ASPI's commitment to reducing the accident rate demonstrates its high ambition. For instance, from 2015 to 2019, accidents on ASPI networks decreased by 41.38%, indicating that recording improvements in safety have been made in the past years. Considering that margins for improvements are now more contained, the object proposed of a further improvement of 2.58% in 2026 compared to 2019 (-0.65% yearly) is therefore considered ambitious. It is worth noting to highlight that ASPI is the only company in this sector to commit to such road safety metrics among its peers[202].

3.4.4 Margin Adjustment for the Sustainability Linked Structure

The fulfillment of the aforementioned KPIs is tied up with the margin adjustment. To receive a margin adjustment, ASPI should attach the Compliance Certificate concerning the relevant financial year to the Sustainability KPI Report, which includes the Realized Score assigned to each selected KPI – as verified by the Sustainable Auditor. Thus, if considering the latest available Sustainability KPI Report, the Realized Scores are reaching or not their respective Target Scores, the Margin will be adjusted as follow:

- ⇒ ***3 KPIs achieved*** will result in a Margin adjustment of ***-5 bps;***
- ⇒ ***2 KPIs achieved*** will result in a Margin adjustment of ***-2.5 bps;***
- ⇒ ***1 KPI achieved*** will result in a Margin adjustment of ***+5 bps;***
- ⇒ ***0 KPI achieved*** will result in a Margin adjustment of ***+10 bps.***

[202] UniCredit, 2022

SPTs will start from 2023 for all KPIs; therefore, there will be no Margin adjustment in 2023 (based on 2022 results). Hence, the first Margin adjustment will occur in 2024, following the Company of the Compliance Certificate concerning the financial year 2023.
ASPI will reinvest the amount equivalent to the Margin decrease for internal ESG initiatives dedicated to further improving its sustainability roadmap and/or to external beneficiaries (such as NGOs, Foundations, etc.) dedicated to sustainability objectives, in line with ASPI's purpose and own ambition.
There is the possibility that a KPI becomes "Non-Relevant," meaning that: i) the KPI is, during two financial years in a row, at least 30% off the Target Score (over or under); ii) or at any time following the Borrower's request and subject to a previous meeting with the Lender and mutual agreement between the Lender and the Borrower, the KPI and/or Target Score is considered as not relevant anymore to define the sustainability strategy of ASPI. If no agreement is found between the Lender and the Borrower within 30 days from the Borrower's request to consider the KPI and/or Target Score not relevant, the Margin will continue to be adjusted according to the remaining relevant KPIs and Targets[203].

The risks related to climate change could translate into potential impacts for the bank, and these impacts could eventually appear as financial risks: There is a direct impact of ESG risk on the bank in that it is directly exposed to such risks; however, there is also an indirect impact due to the risk posed by competing interests that threaten the financial stability of the institution. Changes in the probability of default (PD) and loss given default (LGD) of bank loan portfolios are determined in different climate scenarios to evaluate the impact on credit risk[204]. A company's ESG performance can affect the probability of default, as they express how a company deals with the risks associated with its impact. Better ESG performance means a lower risk of incurring events that can harm the correct operation of the company, its ability to produce income, and, therefore, ultimately, also on creditworthiness towards creditors[205].
Hence, by fostering a sustainability plan and continuing to adjust its sustainability objectives, ASPI will fulfill the KPIs and, consequently, achieve the agreed margin adjustments. These actions will result in an improvement in its credit ratings and, therefore, in a reduction of ASPI's probability of default and, subsequently, in UniCredit credit risk.

[203] UniCredit, 2022
[204] AIFIRM, 2022
[205] AIFIRM, 2021

Between 2021 and 2022, UniCredit has granted Sustainability Linked Loans to five corporations - Autostrade per l'Italia, FS, IVECO, Pirelli, and Stellantis - that, according to their ATECO codes fall into the following ISIC Divisions:

- **Manufacturing** (IVECO & Pirelli)
- **Transportation and storage** (Autostrade per l'Italia)
- **Professional, scientific, and technical activities** (Stellantis)
- **Arts, entertainment, recreation** (FS)

The analysis is enriched with the implementation of a sector-based Heat Map to evaluate and quantify the impact of the ESG factors concerning each economic sector.
The transcoding of both the economic sectors and the evaluation scales is a crucial tool in creating the "ESG Impact Matrix," which represents the fundamental matrix for subsequent analyzes of the impacts of ESG factors. The matrix is constructed as follows:

- Rows display the economic sectors with ISIC coding. The granularity of representation reaches the 4th level of detail and is identified by a 4-digit numerical code preceded by a letter that represents the macro-sector to which it belongs;
- Columns report the ESG factors, divided into three macro-classes (Environmental, Social, Governance), further subdivided into detailed sub-factors (e.g., biodiversity, transition risk, etc.).

The fields of the matrix are fostered by the scores (0;1;2) based on the impact assessments defined in the UNEP FI matrix and the UNEPFI-PSI transcoding matrix.
The "Potential Risk Matrix" definition is functional in determining the potential ESG risk to which UniCredit could be exposed concerning each economic sector.
To define the "Potential Risk Matrix," starting from the "ESG Impact Matrix," two methodologies can be pursued to aggregate the ISIC sub-sectors, which enables to obtain 40 sub-sectors.

Hypothesis 1 consists of the following:

- Counting, within each 2nd level sub-sector and for each ESG factor, the number of cells (one for each 4th level ISIC code) of the matrix that presents an impact (score ≥1).
- Ratio, for each of the ESG factors, of the number of cells with a score ≥1 compared to the total number of cells for the single 2nd level sub-sector, thus obtaining a score between "0-1."

Hypothesis 2 is composed by:

- Halving of the scores (0;1;2) of each of the cells of the "ESG impact matrix."
- The calculation, for each of the ESG factors, of the impact through the simple average of the scores of the cells relating to the single 2nd level sub-sector, thus obtaining a score between "0-1."

The ESG factor aggregation takes place at the sub-sector level (i.e., row of the Matrix), determining an average score for each of the three macro-factors "E, S, G" through the use of the simple average.

The Economic sector aggregation occurs at the macro-sector level (i.e., columns of the Matrix), determining an average score for each economic sub-sector through the simple average.

Once the ESG factor aggregation phase and the economic sector aggregation phase have been completed, an average descriptive score of the impact of the three factors (Environmental, Social, and Governance) is obtained for each economic macro-sector.

Thresholds, as reported in Table 39 & 40, have been defined for each E, S, and G Pillar to divide the economic macro-sectors into risk ranges, which correspond to the percentiles subdivide the distribution of the scores underlying the economic sub-sectors into four equal sections.

Table 39. Risk Range Thresholds for Environmental Factors

	Thresholds HP1	Thresholds HP2
High Risk	>0.75	>0.45
Medium/High Risk	0.38-0.75	0.25-0.45
Low Risk	0.10-0.38	0.10-0.24
Irrelevant Risk	<0.10	<0.10

Table 40. Risk Range Thresholds for Social & Governance Factors

	Thresholds HP1	Thresholds HP2
High Risk	>0.75	>0.45
Medium/High Risk	0.45-0.75	0.25-0.45
Low Risk	0.10-0.44	0.10-0.24
Irrelevant Risk	<0.10	<0.10

The two methodologies mentioned above take the form of the following outcomes:

Table 41. Hypothesis 1 – ISIC Macro-Sector Results

HP1 - ISIC Macro-Sectors Results		
S	E	G
0.19	0.58	0.17
0.20	0.58	0.27
0.15	0.08	0.02
0.14	0.17	0.10

Table 42. Hypothesis 2 – ISIC Macro-Sector Results

HP2 - ISIC Macro-Sectors Results		
S	E	G
0.10	0.36	0.08
0.11	0.37	0.13
0.08	0.04	0.01
0.07	0.08	0.05

Based on the analysis carried out earlier, UniCredit's portfolio, composed of the five corporations stated previously, portrays in terms of ISIC Macro-Sectors and Environmental, Social, and Governance Pillars the following results:

- ***High Risk:*** in all three components (E, S, G), UniCredit presents a 0% exposure.
- ***Medium/High Risk:*** for what concerns the E and G factors, UniCredit faces an 82.51% exposure. On the other hand, UniCredit's exposure considering the S factor, is null.
- ***Low Risk:*** the E pillar exposure accounts for 1.63%, whereas the S pillar exposure reaches 100%, and the G factor registers an exposure equal to 17.49%.
- ***Irrelevant Risk:*** for what concerns the E component, UniCredit faces a 15.86% exposure. The Bank's exposure considering the S and G components is null.

These results are summarized in Table 43:

Table 43. Portfolio Analysis

PORTFOLIO			
Exposition	ISIC Macro-Sectors Results		
	E	S	G
High Risk	0.00%	0.00%	0.00%
Medium/High Risk	82.51%	0.00%	82.51%
Low Risk	1.63%	100%	17.49%
Irrelevant Risk	15.86%	0.00%	0.00%

UniCredit issued sustainability linked loans to the five corporations in the sample mentioned above, granting them margin adjustments upon fulfilling pre-agreed KPIs and SPTs. The margin will adjust as follows:

- ***Autostrade per l'Italia***: Margin Adjustment **-5/+10 bps**
- ***FS:*** Margin Adjustment **± 3 bps**
- ***IVECO:*** Margin Adjustment **± 3.5 bps**
- ***Pirelli:*** Margin Adjustment **± 5 bps**
- ***Stellantis:*** Margin Adjustment **± 2.5 bps**

Following this reasoning, ESG variables can impact a company's performance and that of an industry or region. In the first instance, ESG risks are related to specific issues like the company's governance, regulatory compliance, and brand reputation and only affect one borrower, not the entire market. However, in the second instance, more general concerns affect an entire sector or industry and can be related to factors like legislation, technical advancements, or upstream and downstream markets. Therefore, financial institutions should grant credit to counterparties who are more virtuous regarding ESG concerns, allowing them easier access to lower-cost loans by providing a "discount" on loans given to more "sustainable" counterparties. However, since a positive ESG profile can be proved to be statistically associated with lower credit risk, the introduction of any "discounts" associated with the ESG profile becomes much more straightforward, both conceptually and in terms of policymaker consensus[206].

[206] Resti, Costantino , Vergari, Macellari, & Nale , 2021

CONCLUSION

The concept of sustainability has grown in importance over time, particularly in the economic context. ESG metrics accurately represent this bias, and their consideration is not a new phenomenon since many investors include them in their investing decisions. At the 2019 sustainable conference, the former Bank of England Governor asserted that climate and ESG factors would certainly be the heart of mainstream investing. Thus, ESG not only has the potential to help develop a more resilient financial system but also can increase earnings stability and minimize share price volatility. Despite this, various criticisms have been leveled at the topic: ESG is often seen as non-financial consideration, and their incorporation into traditional financial risk remains problematic. Indeed, ESG is sometimes defined as a long-term investment, yet many institutional investors are focused on a short-term investment horizon. Furthermore, the importance of ESG varies according to the industry in which we invest. From this perspective, there is still a need for industry standards for conducting ESG reposting.

Despite these challenges, the benefits of ESG surpass the current issues, and as a result, their importance, particularly in the future, is critical.

In the first chapter, the analysis examined what ESG is, how investors view it, and the critical differences between the various types of sustainable investments. Following that, an assessment of the SRI methodology and the evolution of the UN PRI was undertaken. Then, the discussion concentrated on the primary reasons for employing ESG in investment decision-making. As a result, the work researched the broader misconceptions around ESG issues. Finally, the analysis focused on the large degree of discordance among rating sources regarding ESG.

In the second chapter, the dissertation examined corporate social responsibility first. Two factors have been considered: its paradigm shift through time and how it may affect firm performance. Then, the analysis concentrated on corporate creditworthiness and the elements that govern it, primarily investigating how ESG issues can affect corporate creditworthiness factors and, as a result, credit risk indicators. Following that, various creditworthiness related ESG indicators were examined, specifically company performance and cost of capital. In the last paragraph, the discussion emphasized the Merton model approach to corporate bonds.

In the last chapter, the analysis first assesses how banks are capturing the potential of ESG risks into their risk management framework, considering that ESG risks are not perceived

as a distinct form of risk but as a component of the pre-existing types of risk. As a result, climate change severely impacts financial institutions due to their lending and investing activities. For instance, the third paragraph provides insights into sustainability-linked lending and the actions a company must follow to obtain a margin reduction in the cost of debt. In particular, the analysis is supported by a Case Study carried out by UniCredit in which the Autostrade per l'Italia case is analyzed. Therefore, three key performance indicators - concerning climate change, gender diversity, and road safety- linked to sustainability performance targets have been laid down. The company and the lender agreed upon an action plan to achieve these targets. The fulfillment of the stated KPIs will result in the reduction of the cost of debt. The company will experience a different margin adjustment depending on the number of KPIs achieved – 3 KPIs achieved -5 bps, 2 KPIs achieved -2.5 bps, 1 KPI achieved +5 bps, and 0 KPI achieved +10 bps. Complying with the pre-agreed KPIs and SPTs entitles ASPI to take advantage of a margin adjustment and thus influence its financial performance. Hence these achievements must be considered in the company's creditworthiness assessment, and they also must be included in the credit rating system that incorporates these two factors qualitatively or quantitatively. These actions consequently foster a decrease in ASPI's default probability and serve as a support tool to highlight that actively implementing ESG policies decreases the lender's credit risk.

Moreover, UniCredit fosters the issuance of sustainability-linked loans to incentivize companies to implement ESG policies upon the possibility of receiving a margin adjustment, but also because the enforcement of ESG policies has a positive effect on the company's financial performance. Over the years, the growing interest that firms are posing in implementing ESG factors into their action plans will be the driver for financial institutions to increase the availability of sustainability-linked loans. This positive trend is also true since a positive ESG profile is statically associated with lower credit risk for the lending institution.

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