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The ESG Premium

Exploring the relationship between sustainable and financial
performance

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Abstract

Corporations have largely grown in size over the last two centuries, and so did their impact on the external environment. The development of the firm beyond anything imagined called for a redefinition of its role in the society: the firm was required to act in a socially responsible fashion and distance itself from the sole objective of profit-maximization. In light of this new role, many have attempted to measure corporate social performance and link it to financial success, although often with poor results. With the rise of ESG reporting in the early 2000s, a growing body of research documented a non-negative relationship between ESG and financial performance. This paper found evidence supporting a negative ESG premium, although questioning the reliability of ESG data.

Keywords CSR, ESG, Social Responsibility, Sustainable Investing

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Introduction

Corporate Social Responsibility (CSR) has become a focal point in today's business landscape, reflecting a growing recognition of the broader responsibilities that corporations hold beyond purely economic interests. The concept of CSR encompasses the idea that businesses should not only strive for financial profitability but also actively contribute to society's well-being and environmental sustainability. This paper delves into the world of CSR, exploring its historical evolution, philosophical foundations, and its intricate relationship with financial performance.

Chapter 1 sets the stage by delving into the roots of CSR, tracing its evolution from the *Laissez-Faire* capitalism to the modern stakeholder theory.

Chapter 2 takes a closer look at the relationship between CSR and financial performance. It examines early attempts to link CSR activities with economic profitability and explores the challenges and ambiguities associated with measuring Corporate Social Performance (CSP). The chapter continues by investigating the rise of ESG, highlighting its transformative impact on non-financial disclosure; further, it elaborates on the most recent studies that attempted to link ESG to financial performance.

Chapter 3 focuses on the methodology employed in this study. It delineates the univariate and multivariate cross-sectional models used to analyze the relationship between ESG factors and financial performance.

Chapter 4 delves into the heart of the analysis, presenting a comprehensive investigation of the ESG premium. It provides a focus on the data sources, including ESG scores and stock characteristics, and elaborates on the results of the research.

Chapter 1

Corporate Social Responsibility

This chapter introduces the evolving perspective on corporate social responsibility (CSR) and its impact on the role of businesses in society. A first discussion on the *Laissez-Faire* theory sheds light on the philosophical framework under which firms first developed as economic institutions, emphasizing their sole role in the economy as profit-making entities. Contrary to the belief of Friedman (1970) on “*The social responsibility of business is to increase its profits*”, the chapter continues by developing on the new social requirements the society was demanding from corporations and the lack of a managerial framework that could match society’s expectations. Following from the statement of Committee for Economic Development (CED), according to which “business exist to serve society” (CED, 1971, p.16), it became clear that businesses had to be more involved in the societal issues, and failing to do so could undermine their future success. Lastly, a new economic paradigm known as *stakeholder* theory is presented as an alternative to the traditional approach which focused exclusively on the profit-motive while neglecting the other business responsibilities towards the society. The new social contract between the society and corporations allowed for a reinterpretation of the role of the firm, now regarded as an economic institution highly interconnected with the society, with the function of representing all *stakeholders* interests by means of a corporate strategy inclusive of the society’s needs.

1.1 The *Laissez-Faire* economy

From French, *Laissez-Faire* means 'let you do'. The Laissez-Faire philosophy was an economic theory born in the 18th century which targeted free-competition as the key to achieve the greater good for the society. In the historical review of *Laissez-Faire* doctrine conducted by Viner (1960), he explained how the increasing faith in the scientific method during the Enlightenment brought the man and its rationality at the center of the discussion. Furthermore, he pointed out that the quest for Truth during that period was driven by the belief of a "natural order" of things; this seminal thought shaped the idea of a self-regulating market as the best way to achieve the social outcome. Indeed, early economists¹ thought that the natural order of things could be achieved only if the rational man was free to act (this is the reason why the *Laissez-Faire* term was adopted). In turn, it followed that the market could be efficient only if government's intervention was bounded to a small set of actions with very limited impact on the economic system. In an efficient free-market system crowded by firms serving their self-interest, Adam Smith's *invisible hand*² could do the job of guaranteeing the greater good by weeding out bad market players, while rewarding good (i.e. profitable) companies. It is in such historical background that corporations developed their first role in the society as self-interest seeking economic institutions. Indeed, thanks to a market mechanism that took care of the social responsibility of business by transforming selfish efforts into the greater social good, firms were freed from taking any responsibility other than being financially successful.

In this regard, the CED (1971) published a statement where it analyzed the development of corporations in the society. Asserting that "business functions by public consent, and its basic purpose is to serve constructively the needs of society-to the satisfaction of society" (CED, 1971, p.11), the CED explained how the *Laissez-Faire* economy worked remarkably well in accommodating the society's demand

¹Known as Physiocrats, these French economists first attempted to apply the scientific method in the discipline of economics. Viner (1960) attributes to them one of the major contributions to the *Laissez-Faire* doctrine

²The term first appeared in *The Wealth of Nations* by Adam Smith. It refers to the unseen forces of the free-market competition that drive self-interests of individuals into the necessary social outcome.

for economic growth, delivering substantial wealth creation and better life quality by providing job and goods; this was what the society desired from corporations at the time.

However, society's needs have changed and it became clear that the *Laissez-Faire* doctrine did not fit the new expectations on the economic system.

1.2 The *Philosophical Vacuum*

The beginning of the 20th century witnessed the significant changes to the world economy. Nationalism was seen as the remedy during a period of political turmoil, where centralized state planning took over *Laissez-Faire* free-market, as pointed out in "*The Great Transformation*" by Karl (1944). In parallel, corporations were getting bigger and gaining increasingly more power, so that the "*Limits to Growth*" became more evident to the society, up to a point where the economic growth implied by the capitalistic free-market system was deemed unsustainable (Meadows et al., 1972). Therefore, if under the *Laissez-Faire* corporations did not have to take on the burden of social responsibility, Frederick (1960) argued that the new political framework, along with an always increasing power of corporations, marked the collapse of the *Laissez-Faire* and called for a redefinition of the social responsibility of business which now have a significant impact on the society. Yet, after reviewing the five main currents of thought since the 1950, ranging from the idea of business responsibility as a voluntary act by the corporate manager to the faith in Christian Ethics providing a framework of good and ethical behavior by corporations, Frederick (1960) argued that all perspectives on social responsibility failed to acknowledge the predominantly self-interest seeking purpose of businesses, where the executives' actions were defined largely in terms of private gain and did not account the value of achieving the social outcome. In detail, he targeted the issue of a lack of a framework for corporate social responsibility as a *philosophical vacuum*.

1.3 A framework for CSR

”With great power comes great responsibility” (Lee & Ditko, 1962, p.14): in few words, this is the CED (1971) perspective on the implications of the development of corporations ”beyond anything imagined by the early economists” (CED, 1971, p.17). Indeed, the enormous growth of businesses in terms of market size and power as well as impact on society called for a redefinition of the social contract of firms. The *Laissez-Faire* economy was a paradigm that could no longer provide reference for proper corporate action, given the decay of the free-market system; the mechanism through which the pursuit of selfish interest by business was channeled in the promotion of a greater good was broken as soon as society’s needs changed and government took a central role in world economies, according to Frederick (1960) and CED (1971). Further, another major change occurred when businesses were regarded no longer as transitory in the economy, rather they were thought as permanent institutions. This new perspective allowed executives to rethink of the business priorities and orient them towards longer-term goals; for example, it became clear that a successful institution had to invest on its employees to ensure its success in the future. Under such circumstances, profitability was seen no more as the ultimate goal, but as a necessary step towards the achievement of broader ends (CED, 1971).

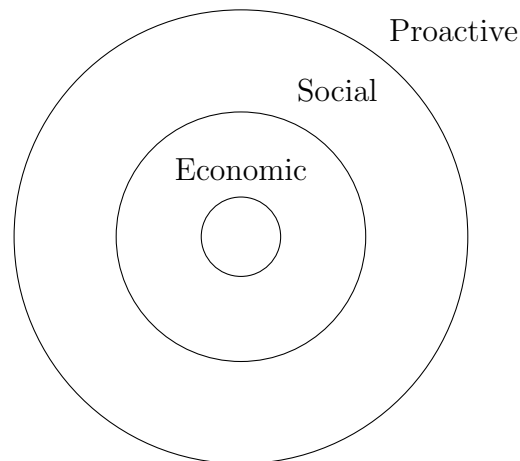
1.3.1 Redefining the role of the firm: a hierarchy of responsibilities

As a consequence of the widespread criticism according to which corporations played a significant role in the deterioration of the environment while being indifferent to the societal problems, the CED (1971) acknowledged the need to define a new social contract in which corporations matched the social expectations from the public. Most remarkably, it proposed one of the first framework of CSR in an attempt to develop a corporate strategy now more inclusive of the public needs. The newly created framework (Figure 1.1) identified the responsibilities of corporations with three concentric circles:

- The *inner circle* involved the basic responsibilities of the firm essential to

achieve an efficient functioning of the economic system, and hence job and wealth creation as well as the supply of goods;

- The *intermediate circle* had to do with the recognition of the changing priorities of the society, now demanding a higher commitment to the achievement of social equality as well as preservation of the environment;
- The *outer circle* laid in the active commitment of corporations in improving the external environment. While public institutions often failed to produce effective legislation in time, large corporations (but not only them) had the capabilities to make a critical difference in anticipating, dealing with and solving societal issues. This approach will be further developed by Burke & Logsdon (1996) as the "proactive" approach of *strategic* CSR.



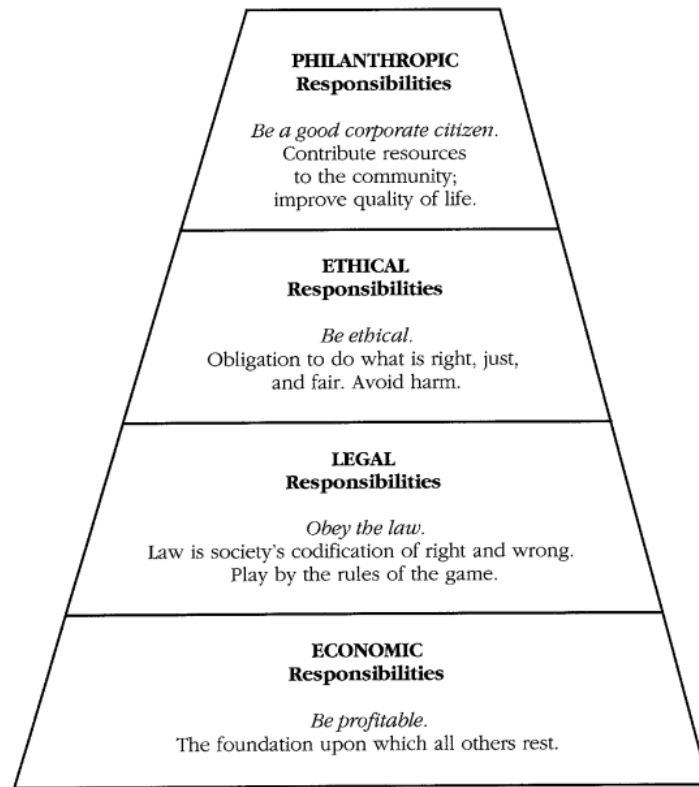
Source: CED (1971)

Figure 1.1: A first CSR framework

Another significant contribution was provided by Carroll (1979), who came up with the first unified definition of CSR:

The social responsibility of business encompasses the economic, legal, ethical and discretionary expectations that society has of organizations at a given point in time (Carroll, 1979, p.500)

In a similar fashion to the CED (1971), Carroll et al. (1991) developed on the previous definition of CSR to provide a framework consisting in a four-step pyramid of social responsibilities, depicted in Figure 1.2. It can be observed that the



Source: Carroll et al. (1991)

Figure 1.2: The Pyramid of CSR

Economic responsibilities were represented as the first layer of the pyramid, and acted as the basement for all the others. It was so because first of all businesses were economic organizations with the scope of providing goods and services to the society, and being profitable was a key responsibility towards the achievement of this and all the other goals (clearly, without profits there would be no business). Immediately after came the Legal responsibilities, which were thought in a close relationship with the economic function of the firm, although represented on a different layer. This type of responsibilities encompassed the minimum requirements to operate in the market and "reflect[ed] a view of *codified ethics*" (Carroll et al.,

1991, p.41). The next two steps of the pyramid were intended for the inclusion of the new social responsibilities the society desired corporations to take on. Ethical responsibilities, represented as the third step, included the accepted rules not yet codified into law. For a corporation, these might have included being aware of the environmental impact of the business in an effort to reduce the harm produced; even though not yet codified into law, pollution is clearly a negative externality that makes everyone worse-off. The fourth and final step of corporate social responsibilities consisted in the Philanthropic responsibilities, defined as the business effort in being a *good corporate citizen*³ within the community. The distinction between ethical and philanthropic responsibilities was an essential contribution of the framework. In detail, the author made clear that firms cannot be deemed socially responsible if they are just a good corporate citizen within the community: while being socially responsible involves meeting society's expectations of moral behavior, philanthropic efforts could be thought as an add-on, because they represented a desired outcome, but were not expected in a moral way (Carroll et al., 1991).

Far from being a comprehensive model, Carroll's pyramid of CSR provided executives with a first framework of corporate responsibilities. Such framework could help the manager in understating that the business responsibility went beyond the generation of profits and had to account for other social needs. Although the pyramid of CSR identified four separate key areas of business responsibilities, it could be viewed also as a unified whole, suggesting managers to formulate the best decision that "simultaneously fulfil all its component parts" (Carroll et al., 1991, p.43), or, at least, be aware that any corporate action had to be evaluated under different perspectives, not only through the lens of profit-making.

³The term *corporate citizenship* first appeared in Carroll (1979) and was later developed in Carroll et al. (1991). The term identifies those corporate actions that extend beyond the relationship with employees and from which the community at large can benefit. Such definition was specified after the American president Clinton created the so called "Ron Brown Corporate Citizenship Award" in 1996; while this award was given to honour companies that established "family-friendly" relationship with their employees, Carroll et al. (1991) explained that corporate citizenship was not limited to relationship with workers, but involved the society at large

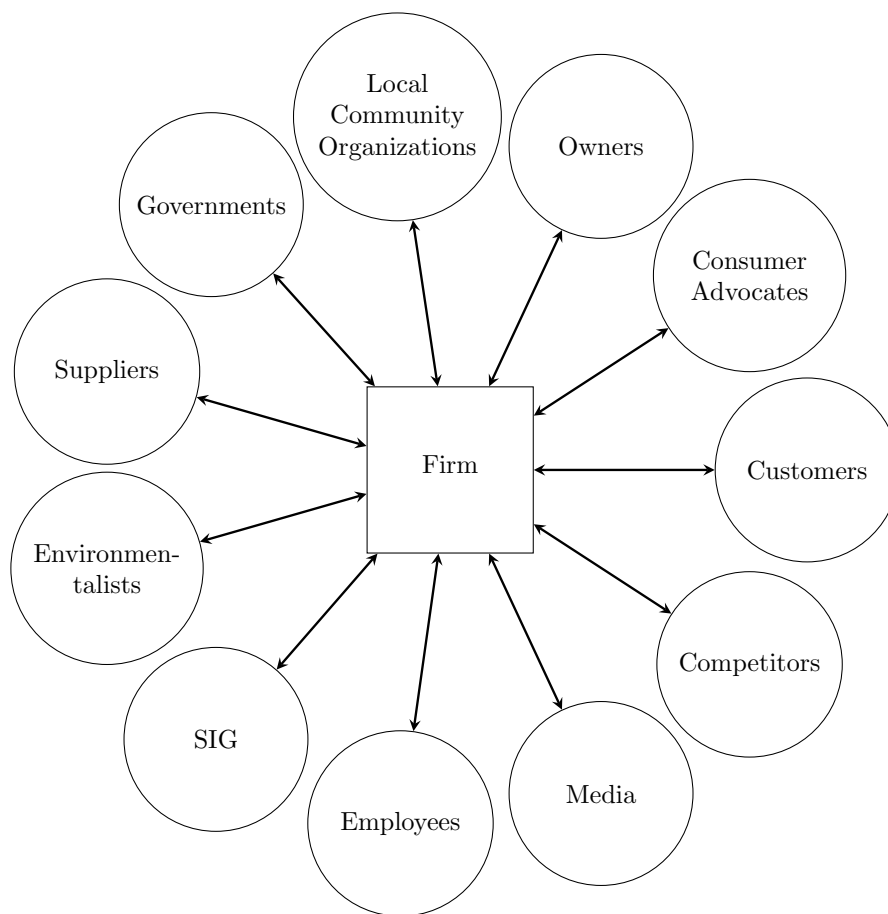
1.3.2 Stakeholder theory

A newer perspective on the role of the firm, now regarded as an economic institution that shares many inter-linkages with the external environment, owes its definition to the contribution of System and Organizational theory, as pointed out by Freeman & McVea (2001). This new perspective represented an alternative to traditional role attributed by the Laissez-Faire because it addressed a corporation as an entity significantly involved in the society. Yet, despite the theoretical contribution, a too broad scope of business was neglecting the necessary autonomy of firms as self-standing entities, and for this reason it lacked of practical implementation. Nevertheless, it became widely accepted the firm had an impact on the society that could not be neglected any longer. In light of this new role of the firm, the CED (1971) introduced the concept of *enlightened self-interest*: after witnessing the critical role the society played in affecting the business of a corporation (for example by means of labor strikes, activism, switch of preferences, etc.), firms that wanted to ensure success in the future had to consider the needs of the society for their own self-interest because avoiding to do so would result in public pressures for government restrictions on business.

The new social responsibilities of the firm were presented earlier in the works of CED (1971) and Carroll et al. (1991), but a critical question was still left to answer: "Who is the firm responsible to?" A formal answer was found in the *stakeholder theory*, a theory of business that acknowledged the mutual relationship between *stakeholders* and the corporation (a map of some of the firm's stakeholders is depicted in Figure 1.3). The roots of the term *stakeholder* can be traced back to a Stanford Research Institute Memorandum in 1963, which acknowledged the importance of understanding the needs of stakeholders, namely "any group or individual who can affect or is affected by the achievement of the firm's objectives" (Freeman, 1984, p.25), in order to develop objectives they would support and ensure success in the future. Most remarkably, stakeholder theory identified the success of the firm in managing the mutual relationship with its stakeholders, rather than in a "uni-directional way". In this regard, it must be mentioned that there were different interpretations of the role played by stakeholders in a firm, and how this relationship should be managed, supported respectively by the Stanford

Research Institute (SRI) and Ansoff (1965). While both agreed on the importance of identifying critical stakeholders, the latter argued in favour of stakeholder as "constraints" to the achievement of traditional corporate goals. Instead, the SRI supported the idea of the corporation as a representative of stakeholders, implying an integration of the society's needs into the corporate strategy. Thus, if Ansoff proposed a "no-harm" stakeholder approach, the SRI argued in favour of the integration of stakeholders' values in the corporate strategy, and hence promoting a "socially-desired" approach.

In an effort to provide a practical framework for corporate executives, Freeman &



Source: Freeman (1984)

Figure 1.3: Stakeholders of a Firm

McVea (2001) developed the essential characteristics a stakeholder approach had

to have. Of these, three critical features laid the foundation of the framework:

1. **Flexible.** A stakeholder approach needed to be flexible enough to provide managers with a single strategic framework that could offer guidance at any point in time, regardless of the strategic problem (e.g. profit-generation, shareholders' wealth maximization, pollution management, etc.).
2. **Active.** Executives had to take an active role in defining the corporate strategy. This entailed acknowledging the impact of a firm on the external environment and vice-versa to actively develop strategic goals that could affect the society in a positive way, rather than thinking of the external environment as something given and out of the corporate scope.
3. **Inclusive.** A stakeholder approach needed to develop strategic goals which incorporated all stakeholders' needs. Traditional frameworks had often failed to do so, focusing exclusively on the shareholders' stake while neglecting the interests of other stakeholders. The new framework had to reject the idea of a single objective function (such as profit-maximization); instead, it should recognize the stakeholders' stake in the company and develop a corporate strategy that integrates multiple objectives.

Along with the other characteristics, these three distinctive features showed what the traditional approach was missing and provided the foundation on which a strategic framework for corporate action should be based on. Hence, the proposal of a stakeholder approach was set to fill the *philosophical vacuum* identified by Frederick (1960), providing a decision-making framework for corporations and an alternative to the traditional approach ruled by the profit-motive.

Although the theoretical foundation of a stakeholder approach looked solid, one might be interested in the extent to which stakeholder theory was actually incorporated in business strategies and if corporations could benefit from it. In this regard, Collins et al. (1994) conducted an analysis on successful vs. unsuccessful companies and found that long-term financial success strongly depended on a business purpose inclusive of strong set of values. This was the case of companies like Walt Disney, whose values were "to bring happiness to millions, and to celebrate, nurture and promulgate wholesome American values".

However, the stakeholder approach still lacked of guidance in matter of practical implementation. For instance, Phillips (1999) highlighted the difficulties in identifying legitimate stakeholders from those who were not: clearly, not all stakeholders were equally important and their stake in the corporation had to be properly evaluated to develop an optimal corporate strategy. Developing on this, Carroll et al. (1991) acknowledged stakeholder identification as the challenge of management, and suggested to classify stakeholders' importance based on their *legitimacy*, "the extent to which a group has a justifiable right to be making its claim" (Carroll et al., 1991, p.43), and *power*, the easiness with which the claim of a group is took into consideration by management. Similar conclusions were obtained by Mitchell et al. (1997).

Besides, another key issue concerned the implementation of a socially responsible corporate strategy in a way that did not imply a profits trade-off. In an effort to deal with this problem, Burke & Logsdon (1996) proposed a framework known as "strategic CSR" which identified five critical dimensions vital for the success of the firm from both a financial and CSR perspective, namely *centrality*, *specificity*, *proactivity*, *voluntarism* and *visibility*.

Despite the difficulties in formulating a detailed and comprehensive managerial framework within which a firm could simultaneously be profitable and contribute to the social outcome, Freeman & McVea (2001) stated that the main value of a stakeholder approach was to expose the traditional shareholder-based theory to being "morally untenable". The increasing societal pressures on corporations to become more involved in the issues of the society made clear that corporations needed to develop managerial strategies according to a CSR framework, and distance themselves from the view of economic institutions solely dedicated to profit generation.

Chapter 2

The relationship between CSR and Financial Performance

2.1 First attempts to link CSR to economic profitability

The increasing recognition of corporations' duty to commit themselves in the improvement of the society well-being led academics to research on the impact CSR practices had on the financial performance of corporations. Indeed, a CSR approach to business, later formalized by Freeman & McVea (2001) in the stakeholder theory, sounded correct from a theoretical perspective but was too undeveloped to replace the neoclassical economic paradigm, as noted by Wood & Jones (1995). Notwithstanding the many previously mentioned contributions in redefining the new social responsibility of firms, as a matter of fact the profit-maximization motive explained by Friedman (1970) was still the dominant economic theory of the firm. For this reason, researchers willing to prove the importance of CSR had to provide supporting evidence on the relationship between Corporate Social Performance (CSP) and Financial Performance (FP): at best, such relationship would be positive and support that engaging in CSR practices could enhance financial returns from the shareholders' perspective; at worst, a non-negative relationship would still support that corporations can seek the greater good for the society without suffering any economic loss related to it (Wood & Jones, 1995). Under

these circumstances, academics attempted to link CSP to FP by means of very different methodologies, looking for the hidden relationship that was strongly believed to exist.

Yet, before commenting on the literature linking CSP to FP, an introduction to the performance metrics available at the time is needed. It will be shown that most of the studies used either investing or accounting metrics to proxy the financial performance of a firm, according to established market practices and consensus among academics. However, a major problem in dealing with this type of research involved the measurement of CSP: while financial metrics evolved from decades, if not even centuries, of continuous development, corporate social responsibility was a new topic still to be explored and hence how to measure the social performance of firms was a trivial question.

2.1.1 Measuring CSP

In the last decades of the 20th century, measuring corporate social performance was a challenging task mainly for two reasons: i) the lack of a consistent CSR framework under which corporate actions could be evaluated (Freeman & McVea, 2001), and ii) the low availability of non-financial data both in terms of quantity and quality (Cochran & Wood, 1984). As mentioned earlier, the first issue could not be resolved as long as empirical evidence on CSR failed to show the upsides CSR policies brought to financial performance, and the second followed accordingly, in the sense that better quality data could be gathered only when adequate importance would be given to CSR, leading to higher society's and regulatory pressures on corporations for transparent disclosure of non financial information. Nonetheless, Cochran & Wood (1984) documented that at the time academics relied on two separate measures of CSP: a) Reputation Index and b) Content Analysis.

2.1.1.1 Reputation Index

A reputation index relies on the observers' opinion on how well they think a company ranks in the management of CSR. In the early 1970s, the Council of Economic Priorities came up with the first formulation of the index by ranking 24 companies

according to their performance on pollution control. Later on, a more comprehensive and widely adopted reputation index was proposed by Moskowitz (1972, 1975), who classified firms into two reputational buckets ("best" or "worst").

Clearly, these indexes exhibited a high extent of subjectivity, and the main critique deemed them to be unreliable as they just reflected the perception of how a company was doing, rather than mirroring the actual social commitment of the firm. On a positive note, reputation indexes were internally consistent, because the assessment method of observers was always the same across the considered sample of corporations (the same observer was asked to provide his opinion on all the companies within the sample). Yet, a too narrow sample size posed threats to the generalization of results obtained from the adoption of such index.

One popular instance of a reputation index was provided by *Fortune*. The firm pooled thousands of executives' opinions to produce a composite index of the "most-admired" corporations in America, including more than 300 firm. Despite its wide use as a market proxy for socially responsible companies, the *Fortune* index was not free from critiques, as many questioned its reliability after witnessing that Philip Morris, the well-known tobacco firm, was consistently ranked among the top positions (Wood & Jones, 1995).

2.1.1.2 Content Analysis

Content analysis instead aimed at providing a more objective CSP assessment method. It consisted in the evaluation of corporate reporting in regard of CSR activities, ranging from a simple "tick-the-box" approach, looking at whether specific social issues were dealt with or not, to more complex techniques aimed at quantifying performance on a particular item. The advantages of this method included scalability, as the same approach could be iterated over large samples, and a higher extent of objectivity with respect to reputational indexes, as the assessment was based on disclosed data rather than perceptions. On the other hand, content analysis still suffered deficiencies in both the subjectivity involved in deciding what categories to consider as representative of a company's CSP and the reliability of voluntarily disclosed CSR data by corporations which did not reflect necessarily what the company was actually doing.

Among the most relevant indicators, the KLD scale deserves an honorable mention. Owing its name to the contribution of Kinder, Lydenberg, and Domini (1993), KLD was a social investment firm that produced CSP ratings over hundreds of firms listed in the stock exchange. KLD ratings were based on variables that were believed to represent the most influential areas of CSR, such as pollution and community and employee relations. Still, KLD ratings were criticized for not providing any reason on why some CSP categories were included while other were not, positing doubts on the extent to which their assessment method provided a comprehensive view of a company's CSP (Wood & Jones, 1995).

2.1.2 Empirical evidence until the early 1990s: ambiguous results

In the 1980s, many have been the attempts made by academics in reviewing existing literature in order to draw conclusions on if and how CSP and FP were related, although often with poor results. Among the first researches of this kind, Arlow & Gannon (1982) analyzed 7 studies (summarized in Table 2.1) and observed empirical evidences were very mixed, and by no means conclusive. They pointed out the lack of methodological rigor in most of the reviewed studies raised questions on the validity of the results obtained. For example, two studies carried out by Moskowitz (1975) and Vance (1975) concluded opposite results even though an identical approach was implemented on the same set of stocks, with the only difference relative to the time-span considered. In detail, Vance (1975) compared the performance of the "responsible" stocks earlier identified by Moskowitz (1972) with other firms listed in traditional market indexes and found that the 13 out of 14 responsible stocks under-performed their traditional peers, as opposed to the out-performance documented by Moskowitz (1975). At first these two results seemed inconsistent, however it was explained that the use of change in price per share to proxy financial performance was a misleading metric that did not account for risk (and neither dividend income). An exhaustive explanation of this apparent inconsistency was provided by Cochran & Wood (1984), who documented how the

Author(s)	Sample	Social Measure	Profit Measure	Results
Sturdivant & Ginter (1977)	28 corporations in 1975 <i>Fortune</i> 500.	Moskowitz's ratings of best or worst, and authors' rating of honorable mention.	Growth in EPS relative to industry average 1967-1974.	Best and honorable mention have significantly higher growth in EPS than worst.
Parket & Eilbirt (1975)	80 firms in 1971 Forbes roster of Biggest Corporations.	Author's judgment.	NI. NI as a percent of sales. NI as a percent of shareholder's equity. EPS.	Socially responsible firms (80) have greater median values on all dimensions compared to 1973 <i>Fortune</i> 500 list.
Bowman & Haire (1975)	82 firms in food processing in 1973 Moody's Industrial Manual.	Percent of prose in annual report on social responsibility.	Mean or Median ROE 1968-72 or ROE 1969-73.	Both mean and median higher for firms with some discussion than none. Medium mention firms have significantly greater median ROE than either high or low mention.
Vance (1975)	45 and 50 major corporations.	Ratings by students and executives in 1972 Business and Society Review.	Per share stock price 1/1/75 as percent of 1/1/74 price.	Average ratings of both groups negatively correlated with 1974 stock market performance.
Folger & Nutt (1975)	Nine paper companies.	Government pollution indices.	P/E ratio. Mutual fund purchases (in dollars). Common stock price. (Data from selected quarters 1971- 72)	No positive relationships.
Alexander & Bucholz (1978)	41 firms from Vance (1975).	Same as Vance (1975).	Risk-adjusted ROE 1970-74 and 1971-73.	No significant relationships.
Abbott & Monsen (1979)	450 corporations in 1975 Fortune 500.	Social Involvement Disclosure Scale (Number of social action disclosures in annual reports).	Total returns to investors 1964-74.	No meaningful difference in total returns to investors for high and low involvement firms.

Note: EPS is earnings per share; NI is net income; ROE is return on equity; P/E ratio is price earnings ratio.

Source: Arlow & Gannon (1982)

Table 2.1: The 7 studies reviewed by Arlow & Gannon (1982)

portfolio of stocks used in the two studies had a market *Beta*⁴ of 1.56. Thus, the superior and inferior performance found by the two studies was likely explained by a higher sensitivity to market changes during bull and bear markets, rather than by the social performance of corporations. In addition, after both dividend income and risk were factored in, Alexander & Buchholz (1978) failed to find any significant link between social and financial performance. Along with methodological issues and inconsistencies, Alexander & Buchholz (1978) expressed their doubts on the extent to which CSP indicators were reliable, questioning the validity of surveys such as the one provided by *Fortune* on the "most-admired" corporations, given the limited information the respondents had to make an assessment of the CSP of a firm.

Cochran & Wood (1984) also reviewed literature but concluded that very little could be said about a positive CSR-FP relationship. They pointed at questionable methodology and specification of the financial variables as two major problems threatening the validity and comparability among the studies, although it was with the following statement that they expressed their primary concerns: "First, better measures of CSR are desperately needed. [...] Second, more extensive measures of CSR are also needed." (Cochran & Wood, 1984, p.55). In the literature review named "*Data in search of a Theory*", Ullmann (1985) delved in the methodological assessment underlying the 31 reviewed study, and argued that a great number of them did not provide any theoretical justification on why the variables involved should be related, such as those studies which employed quality of social disclosure as a proxy for CSP, expressing serious concerns on the validity of the results obtained. On top of this, he did not find any consistent empirical evidence that proved the CSP-FP relationship, and addressed one major cause to the lack of proper social performance measures, asserting that "new ideas and approaches are badly needed" (Ullmann, 1985, p.554-555).

Although similar conclusions were reached by Wood & Jones (1995), their study

⁴The market Beta was first introduced by Sharpe (1964) in the Capital Asset Pricing Model (CAPM). The CAPM is used to calculate the expected return of a security, relying on the assumption that the market risk is the only determinant of a security's return. In the CAPM formula $R_i = R_f + \beta_i(R_m - R_f)$, the β_i is calculated as $\beta_i = \frac{\text{Cov}(R_i, R_m)}{\text{Var}(R_m)}$, and measures the exposure of a security's return relative to the market; the higher the beta, the greater the sensitivity of a security to market movements.

was perhaps one of the most promising. After acknowledging the lack of a theoretical framework explaining why some social and financial variables should by any means related, they turned to stakeholder theory for a plausible justification for these relationships and recommend its implementation in future research. Despite their review of the literature produced ambiguous result similar to what previous researches obtained, they found in event studies a consistent relationship between social irresponsibility and negative returns, concluding that socially irresponsible corporations were worse-off. Yet, they agreed with previous research in addressing one major issue in the lack appropriate measures of CSP.

A review of these studies suggested one common denominator among them: poor CSP data. CSP metrics exhibited a dual deficiency, characterized by their poor quality and limited availability. Indeed, the importance of CSR was still widely questioned at the time and the absence of a proper framework to measure CSP made academics employ unreliable proxies of CSP. Also, there was only a limited number of companies reporting on CSR, and this further complicated the reach of significant findings.

2.2 The rise of ESG

2.2.1 A new era of non-financial disclosure

The beginning of the new millennium witnessed a re-orientation of business priorities towards sustainability. The number of companies reporting on non-financial activities increased from 30 (in the 1990s) to 7,000 (in 2014), and assets under management (AUM) committed to follow the United Nations Principles for Responsible Investment (UNPRI) sky rocketed to \$45 trillion, roughly 60.8% of the total (Khan et al., 2016). Indeed, a greater awareness in regards of sustainability made people wish to invest their money responsibly for the greater good, and this trend is projected to rapidly increase as long as Millennials and Gen Z, the two generations mostly concerned on sustainability⁵, will assert their priorities. Further, responsible investing has been at the centre of the attention of interna-

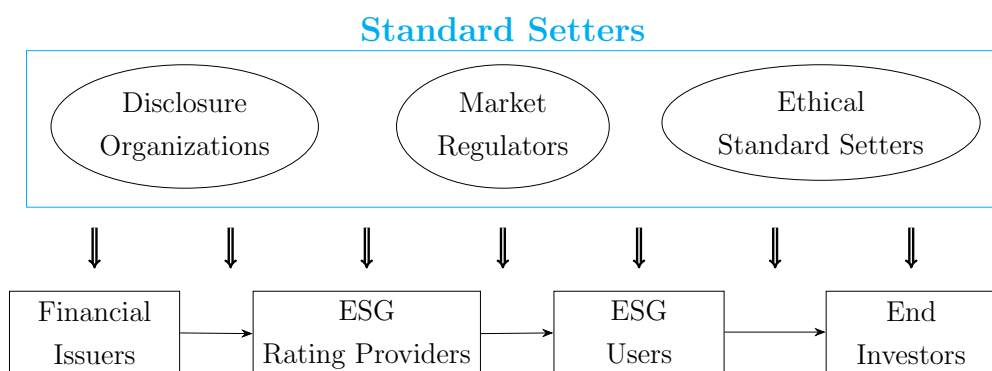
⁵Source: WEF (2022) "Gen Z cares about sustainability more than anyone else – and is starting to make others feel the same"

tional organisations in recent times, with summits such as the UN Climate Change Conference (COP21) making clear by means of the Paris Agreement (2015) that efforts must be taken now to reduce the human footprint on our planet, with the target of holding the global temperature well-below the 2°C, a critical threshold that if exceeded will significantly increase the number of climate change disasters in our planet. Within this landscape, the concept of sustainability was broadened to include also for the society's issues; indeed, this became clear in 2016 when the United Nations set the 17 Sustainable Development Goals (SDGs), encompassing targets from the preservation of the environment to the eradication of poverty.

The increasing involvement of the society in demanding ways to match economic with sustainable development translated into greater stakeholders' pressures on corporations to disclose sustainability reports. In a first attempt to formalize these stakeholders' claims, the UNEP Finance Initiative (UNEP FI, 2004) investigated the effects Environmental, Social and Governance (ESG) issues had on the equity valuation, and found that ESG issues affected the long-term shareholder value of securities. In light of these findings, the UNEP FI urged corporate executives to report on this type of non-financial disclosure, as well as regulators to update financial disclosure standards to include ESG considerations. Today, more than 96% of S&P 500 and 81% of Russell 1000 companies disclose sustainability reports (G&A Institute, 2022), and some regulators already announced that will make it mandatory to report on ESG issues. This is the case of the European Union, which initially required all corporations with more than 500 employees to publish non-financial disclosure reports (Directive 2014/95/EU), and now broadened the set of corporations to include for Small and Medium Enterprises (SMEs) by means of Directive (EU) 2022/2464.

2.2.2 The ESG ecosystem

In order to understand how ESG reports are made and used, an overview of the actors involved along with the functions they perform is necessary. In the OECD (2020) report, the ESG ecosystem (depicted in Figure 2.1) is presented as a highly interconnected environment that encompasses all actors involved in the use, generation, oversight and regulation of ESG data.



Source: OECD (2020)

Figure 2.1: The ESG Ecosystem

In detail, the main actors are:

- **Financial Issuers.** A financial issuer is any issuer that raises capital through capital markets in the form of equity or debt. They include corporations as well as public institutions such as sovereigns. Up to now, many financial issuers disclose non-financial information, although unaudited and often on a voluntary basis (Christensen et al., 2018).
- **ESG rating providers.** Several companies are now in the business of ESG rating. They include large financial data providers such as Bloomberg and Thomson Reuters, firms involved in the supply of financial services like MSCI, but also ad-hoc companies like Sustainalytics, specialized in the analysis of non-financial information. Their scope is to gather non-financial information from companies' sustainability reports and reclassify it under existing ESG reporting frameworks set by disclosure organizations. Further, they utilize ESG reports to provide an assessment of how a firm is doing relatively to ESG issues, which is ultimately summed up by an ESG rating (or score).
- **ESG users.** This category includes asset managers, institutional investors and public authorities. These entities use ESG data for different purposes, but often derive benefit from the insights offered in ESG reports. Asset managers use ESG data to create financial products like investment funds and ETFs with an either general or specific purpose to achieve an ESG performance that suits end-investors' investing objectives. Similarly, institutional

investors (e.g. pension funds, insurers and hedge funds) often incorporate ESG data in investment process to align with their fiduciary duties. Public institutions like central banks may instead derive benefit from the integration of ESG information in the long-term management of their reserves in a sustainable fashion.

- **End Investors.** End-investors are those who ultimately own securities, and hence take investment decisions based on their own preferences.
- **Standard Setters.** The whole ESG ecosystem is highly influenced by standard setters, which provide guidance, rule and oversee the financial system in regards of the integration of long-term sustainable approaches to investing. Standard setters can be further distinguished into three different categories:
 - i) Disclosure Organizations, ii) Regulators and iii) Ethical Standard Setters.
 - **Disclosure Organizations.** This category groups those entities that deal with the preparation of frameworks for non-financial disclosure. The most influential institutions include the Global Reporting Initiative (GRI) and the Sustainability Accounting Standards Board (SASB) in regards of the general practices. Furthermore, some institutions can have a more specific focus, such as the Taskforce on Climate-related Financial Disclosures (TCFD) which deals with climate-specific issues. It must be noted that the reporting standards set by disclosure organizations are developed for reference, but they are by no means binding.
 - **Regulators.** Regulators are those bodies that can demand ESG disclosure to corporations under their jurisdiction. They include governments and stock exchanges.
 - **Ethical Standard Setters.** Ethical standards are produced by international organizations like the United Nations or the OECD. They provide guidance in regards of what is ethical and appropriate conduct, such as the UN with the issue of the Sustainable Development Goals.

2.2.3 The ESG scoring process

The assessment of the ESG scores is perhaps one of the most challenging activity that ESG data provides carry out. First, raw ESG data is generated by financial issuers in the form of non-financial disclosure reports. However, these reports are unaudited, and here is where ESG rating providers exercise their functions: their role is to gather as much information as possible from a company’s sustainability reports, sometimes even turning to third-party providers of data such as media, and classify it under an ESG framework of reporting. Yet, these ESG frameworks can vary significantly among data providers in the criteria considered, and this is because there is not yet a standardised way of ESG reporting, which represents of the biggest issues of ESG. Nevertheless, a comprehension of the general methodology underlying the preparation of ESG reports is necessary to understand how ESG scores are made.

Table 2.2 provides an overview on the key constituents by pillar (Environmental,

Pillar	Thomson Reuters	MSCI	Bloomberg
Environmental	Resource Use	Climate Change	Carbon Emissions
	Emissions	Natural resources	Climate change effects
	Innovation	Pollution & waste	Pollution
		Environmental opportunities	Waste disposal
			Renewable energy
			Resource depletion
Social	Workforce	Human capital	Supply chain
	Human Rights	Product liability	Discrimination
	Community	Stakeholder opposition	Political contributions
	Product Responsibility	Social opportunities	Diversity
			Human rights
			Community relations
Governance	Management	Corporate governance	Cumulative voting
	Shareholders	Corporate behaviour	Executive compensation
	CSR strategy		Shareholders’ rights
			Takeover defence
			Staggered boards
			Independent directors
Key Metrics and Submetrics	186	34	>120

Source: OECD (2020)

Table 2.2: ESG criteria by provider

Social and Governance) used by three ESG data providers: Thomson Reuters, MSCI and Bloomberg. Regardless of the different criteria that providers choose to capture how well a firm performs in the three ESG pillars, in general the process involves the identification of criteria as well as metrics that monitor performance in that specific field. For example, MSCI believes that a key criteria to be considered in the evaluation of the environmental performance of a company is "Pollution & waste". Thereafter, MSCI employs a set of metrics to monitor how the company ranks in that field with respect to the industry of reference or to the company's own track record; in this case several metrics can be employed, such as greenhouse-gas (GHG) emissions and percentage of recycled material. Doing so enables the rater to build a somewhat objective method to assess performance on a specific criteria and produce a score that reflects how well the company is doing in the area of interest. Once the scores have been assigned to all the criteria considered, the overall ESG score is nothing but the result of a weighted combination of these scores; the ESG score is often represented either as a numeric score in the 0-100 range or as a letter rank similar to those employed by credit risk rating agencies (e.g. AAA, B, CC).

At this point, looking at divergence among the criteria considered among ESG data providers, one may ask on what basis do raters decide which are the right indicators to consider, and which other instead can be left out of the scoring assessment method. Indeed, a similar concern arose earlier in regards of the KLD data (section 2.1.1.2); the scores produced by KLD were the result of an assessment method that focused on a set of social criteria, but no rationale was provided on why the social criteria considered should have been good proxies of CSP. This lack of transparency in the underlying criteria-selection methodology made investors mistrust KLD scores as they could not understand them properly. Today, any ESG criteria is included in the evaluation as long as that issue considered is *material*; the *materiality* principle is key for understanding the rationale underlying ESG reports, and hence a detailed explanation on its meaning is provided in the next paragraph.

2.2.3.1 Materiality

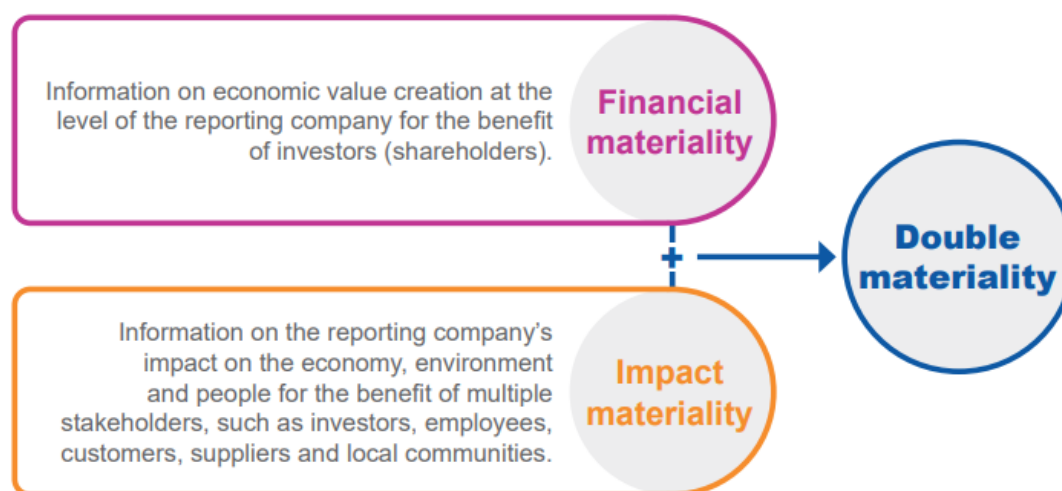
In financial accounting, the principle of materiality determines what information can or cannot be left out of the financial statements. In detail, an information is considered material if the omission of it is likely to influence the user's decision. This accounting principle provides guidance in the preparation of financial statements, as it promotes a relevance-based approach: any information that is relevant, both in terms of nature and magnitude, shall be included in an entity's financial report; if not, it can be omitted (IASB, 2017).

In principle, the same idea applies to ESG reporting, although a distinction between two perspectives of materiality must be made depending on who considers an information to be material. On one hand there is *financial* materiality, which coincides with the guiding principle in accounting standards that rules over the preparation of financial reports; information is financially material if it affects a decision on the expected economic performance of the entity at question. On the other hand, an information can still be material for non-investors stakeholders that aim at evaluating an entity's impact on the external environment, even if such information may have very little effect on the future financial performance of the entity; in this regard, the term *impact* materiality is used. So, the concept of materiality ultimately depends on what a user expects to learn from the ESG report. For example, consider the extent to which GHG emission are material for the following two firms: a bank and a logistics company. In the latter case, the revenues of the logistics company are likely to be strongly correlated with GHG emissions and this is because if the firm wants to increase its top-line figure, this must inevitably come at the cost of higher pollution (e.g. more trucks are employed and hence emissions increase). What instead can be said about the bank when looking at the same metric? Indeed, the revenues of a bank do not directly depend on GHG emissions; however, a bank still has GHG emissions and stakeholders may show an interest in understanding how that bank is managing its environmental impact. This example provides a perspective on the two implications of the materiality principle: financial and impact materiality.

So, what type of materiality should ESG reporting focus on? According to a Global Reporting Initiative's article (GRI, 2022), both concepts are needed and

disclosure organizations should develop standards that aim at the inclusion of financial as well as impact materiality. This is the idea underlying the concept of double materiality introduced by the GRI (Figure 2.2). Further, the GRI explained that impact materiality will become financially material at some point in the future, and pointed out that there currently exist a limited comprehension how non-financial information will influence financial performance.

A similar position was held by the OECD, which supported the idea that the



Source: GRI (2022)

Figure 2.2: Double materiality

concept of financial materiality has not been sufficiently explained, in particular regarding the time-horizon by which non-financial ESG information will affect financial performance (OECD, 2020).

From a practical point of view, ESG rating agencies have been primarily investor-concerned, aiming at providing ESG data and scores useful for driving long-term value creation. For instance, the ESG rating agency Sustainalytics explained that their ESG Risk Ratings "measure the degree to which a company's economic value is at risk driven by ESG factors" (Sustainalytics, 2021, p.4). Yet, it must be noted that disclosure standards are continuously evolving and by no means definitive. Besides, some early applications of the double-materiality principle can already be found among several data providers: Russel Investments implements an approach

that distinguishes how a company scores on both financially material and immaterial ESG issues (Russell Investments, 2018); similarly, Thomson Reuters disposes of more than 400 ESG metrics, but then selects only a subset of 186 of them for scoring purposes according to their long-term impact on financial performance.

2.2.4 Challenges to ESG reporting

Non-financial disclosure has significantly improved since the last decades of the 20th century, mostly because the increasing stakeholders' awareness in matter of sustainability put pressures on corporations to report on this type of information. Furthermore, the continuous refinement of disclosure standards allowed ESG reports to be filled with better quality data with respect to the first CSR reports. Yet, it is too early to celebrate, and a satisfactory framework for ESG reporting is still far from being reached. The challenges of ESG disclosure are several, and many question whether there will ever be a solution to them. After a consultation process on how ESG reporting could be improved, the WEF (2019) documented that many different answers were provided, although a high consensus was found relative to three issues:

1. Complexity of ESG reporting
2. Incomparability of company ESG data
3. Lack of transparency and overall confusion across ESG rating providers

In regards of the first issue, the respondents argued that non-financial disclosure reports are too complex for corporations, in particular relative to SMEs which often struggle in understanding how materiality applies to their context; the high complexity of these reports poses a threat to both quality and volume of ESG data, because corporations do not have neither the resources or the know-how to disclose non-financial information. For what concerns ESG data incomparability, it was argued that reporting standards were too general in addressing the metrics to be employed: two firms that adhered to the same ESG disclosure framework could dispose of significantly different metrics (e.g. gender diversity could be targeted through different metrics, such as diversity by position or diversity as share

of all employees), thus making comparability among them impossible. Lastly, a significant divergence among ESG rating providers constituted a major issue in establishing trust in the ESG ecosystem. Supporting evidence of this divergence was provided in an investors' survey by SustainAbility (2019), explaining that ESG scores alone were of little value for investors, and they rather carry their own analysis on specific ESG issues than entrust the overall scores provided by rating agencies. Further, the respondents claimed that they did not trust the raters primarily because of a lack of transparency in the methodology underlying ESG evaluation. In a very detailed fashion, Berg et al. (2022) delved into the divergence across the ESG scores provided by 6 rating agencies and discovered that there was a substantial disagreement between them. They found that the average correlation in ESG scores was 0.54, but could range from 0.38 to 0.71. Most remarkably, their methodology allowed to determine the causes of why ratings differed: they reported that 56% was attributable to measurement divergence, 38% to scope divergence and a final 6% to weight divergence⁶. On top of this, they also documented that raters showed an evaluation bias known as "halo effect", according to which better scores are given to a company if it scored well in previously analyzed issues.

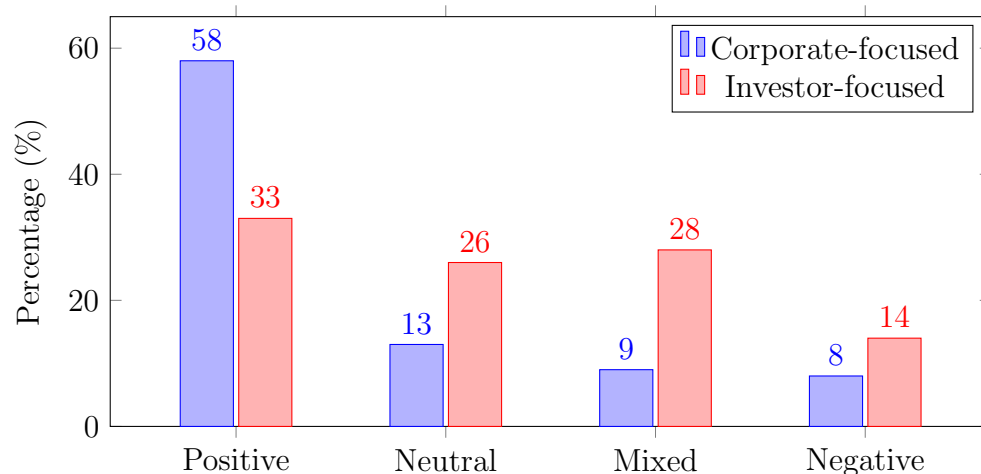
Clearly, the materiality principle alone does not guarantee convergence in ESG scores. Table 2.2 already showed divergence among ESG raters, because different criteria were employed respective to what the rater believed to be material issues for rating purposes. Despite the disagreement among raters can bring value to investors as they benefit from knowing what is the average consensus around ESG scores, this is true only to some extent, beyond which ESG ratings just become useless; (Berg et al., 2022) and (SustainAbility, 2019). The cause of such divergence can be traced back to the lack of a common disclosure standard, with several disclosure organizations providing their own view on the best practices for ESG reporting. Further, the disagreement on ESG ratings may be due to a degree of subjectivity intrinsic to the assessment of corporations' ESG performance, thus making ESG ratings impossible to converge (Cochran & Wood, 1984).

⁶The authors explained the three sources of divergence as follows: " *Scope divergence* refers to the situation where ratings are based on different sets of attributes. [...] *Measurement divergence* refers to a situation where rating agencies measure the same attribute using different indicators. [...] *weight divergence* emerges when rating agencies take different views on the relative importance of attributes." (Berg et al., 2022, p.3)

2.3 Review of recent studies linking ESG to FP

This last section of the chapter elaborates on the most recent research in regards of the relationship between ESG ratings and FP. While empirical evidence remains mixed, some studies have employed promising methodologies for future research and applications.

In a literature review of more than 1,000 studies since 2015, Whelan et al. (2021) documented the results obtained by distinguishing between corporate and investor related studies. The difference is that studies of the first type assessed financial performance by means of operational metrics (e.g. ROE, ROA), while investor-focused studies measured the impact of ESG from a portfolio perspective, and hence looked at metrics such as alpha and risk-adjusted returns. The results of the review, depicted in Figure 2.3, showed a growing consensus among corporate studies, with 58% of them providing supporting evidence for a positive relationship, and an overall 71% reporting non-negative results. The authors explained that



Source: Whelan et al. (2021)

Figure 2.3: Combined evidence from more than 1,000 studies since 2015

the implementation of sustainability strategies at the corporate level was likely to boost innovation and operational efficiency, thereby benefiting corporate financial performance. On the other hand, empirical evidence in regards of investor-focused studies remained largely mixed as there was no clear consensus on which direc-

tion did ESG performance affect FP, with only a little fraction (33%) of positive findings. Still, they highlighted that the time-horizon considered was a crucial determinant in the outcome of the investigation and reported that studies with a long-term focus were 76% more likely to find positive results. The outcome of this study is consistent with an earlier literature review carried out by Friede et al. (2015), representing one of the largest contribution to the field with more than 2,000 studies analyzed. The researchers suggested that there is enough evidence to support the case for ESG having a positive influence on financial performance, with 90% of the reviewed studies reporting a non-negative relationship and an average correlation of 0.15. However, the authors failed to draw any significant conclusion relative to portfolio related studies, possibly because the construction of an ESG portfolio is subject to constraints (e.g. trading costs, non-diversifiable exposure to other factors) which could result in the cancellation of any ESG premium.

According to Khan et al. (2016), empirical evidence was mixed because previous studies failed to factor in materiality. Disposing of the Materiality Map guidance provided by the Sustainability Accounting Standards Board (SASB), they proposed a methodology that dissected ESG ratings in two components according to how a company scored on material and immaterial issues. The results obtained are remarkable: they found that investing in material sustainability issues could enhance portfolio returns by a 3%-8% annualised alpha; on the other hand, investments in immaterial issues were found to have a negligible impact on the portfolio. In support of this materiality-driven approach, Clark & Harshad (2020) implemented a similar methodology and found that ESG was an alpha-enhancing factor that could lead to higher returns. Further, they proposed a strategy that focused on ESG *Improvers* rather than *Leaders*, under the rationale that the market overemphasized the latter and hence created an out-performance opportunity for the former. Lastly, the study conducted by Lioui & Tarelli (2022) deserves an honourable mention. Besides the reported positive and significant ESG premium, the authors proposed a methodology to construct a *pure* ESG portfolio, where the term "pure" signals a portfolio that by construction is exposed to one variable only, the ESG factor in this case. The benefits of such approach are multiple, but most remarkably a portfolio so constructed neutralizes the role played by other

variables and in turn allows to overcome the "market-bias", according to which investing in high ESG stocks implies gaining exposure to large-cap corporations, given that those are the ones that get the highest ESG scores.

The next chapters will expand on the methodology provided by Lioui & Tarelli (2022) and present the results obtained on a pure ESG portfolio constructed on a subset of European corporations listed in the STOXX 600 Index.

Chapter 3

The ESG premium: Methodology

The methodology employed in the analysis of the ESG premium relies on the seminal contribution of Fama & MacBeth (1973), who developed a cross-section approach to construct linear asset pricing models. Further, valuable insights were gathered from the study of Lioui & Tarelli (2022), who focused on the estimation of the ESG factor premium by extending the methodology of Fama & MacBeth (1973) to include for other stock characteristics, resulting in a multivariate cross-sectional (MCS) model. Next, it will be shown how the implementation of a cross-sectional (CS) methodology can result in *pure* ESG portfolios. In order to provide an easily interpretable approach, the CS methodology is explained through the implementation of a univariate cross-sectional (UCS) model; also, it will be proved that it is possible to control for other variables in the MCS version of the model while still obtaining a *pure* ESG portfolio.

3.1 Univariate Cross-Sectional model

The rationale underlying a UCS methodology that aims at assessing the ESG factor premium is to perform a cross-sectional regression of stocks' returns over their ESG ratings at every time- t . So, differently from a time-series (TS) regression where the return time-series of a single stock is regressed on another TS factor (e.g. the market risk premium), in the CS methodology a number T of regressions are

performed over N stocks⁷, where T and N are respectively the total number of periods and stocks observed in the $T \times N$ data sample. In formula, the UCS model for the ESG factor is defined as follows:

$$\mathbf{r}_t = \lambda_{0,t} \mathbf{1}_N + \lambda_{1,t} \mathbf{ESG}_{t-1} + \boldsymbol{\epsilon}_t \quad (3.1)$$

where \mathbf{r}_t , $\mathbf{1}_N$ and \mathbf{ESG}_{t-1} represent respectively the $N \times 1$ vectors of excess returns, ones and lagged ESG ratings for all the assets at a given time- t :

$$\mathbf{r}_t = \begin{pmatrix} r_{1,t} \\ r_{2,t} \\ \vdots \\ r_{n,t} \end{pmatrix} \quad \mathbf{1}_N = \begin{pmatrix} 1 \\ 1 \\ \vdots \\ 1 \end{pmatrix} \quad \mathbf{ESG}_{t-1} = \begin{pmatrix} ESG_{1,t-1} \\ ESG_{2,t-1} \\ \vdots \\ ESG_{n,t-1} \end{pmatrix} \quad (3.2)$$

Further, Lioui & Tarelli (2022) noted that an easy long-short portfolio interpretation follows by de-meaning the ESG ratings at each time- t , which implies setting:

$$\sum_{i=1}^N ESG_{i,t-1} = 0 \quad (3.3)$$

Hence, the ordinary least squares (OLS) estimates for the factor coefficients $\lambda_{0,t}$ and $\lambda_{1,t}$ are given by:

$$\begin{pmatrix} \hat{\lambda}_{0,t} \\ \hat{\lambda}_{1,t} \end{pmatrix} = (\mathbf{X}'_{t-1} \mathbf{X}_{t-1})^{-1} \mathbf{X}'_{t-1} \mathbf{r}_t \quad (3.4)$$

$$\text{with } \mathbf{X}_{t-1} = [\mathbf{1}_N \quad \mathbf{ESG}_{t-1}] \quad (3.5)$$

$$\text{and } \mathbf{w}_{t-1} = \left[\frac{1}{N} \mathbf{1}_N \quad \frac{1}{\mathbf{ESG}'_{t-1} \mathbf{ESG}_{t-1}} \mathbf{ESG}_{t-1} \right] \quad (3.6)$$

Most remarkably, the two vectors of weights in Equation (3.6) identify two time- t portfolios: the first portfolio can be interpreted as an equally weighted portfolio

⁷Although Lioui & Tarelli (2022) refer to the number of stocks as N_{t-1} , this paper uses N instead because the number of stocks analyzed is constant across all periods, and hence $N_{t-1} = N$ for any time- t

that assigns a constant $\frac{1}{N}$ weight to each stock, while the second coincides with a zero-investment⁸ long-short ESG portfolio that invests in stocks with an ESG rating above the cross-sectional average and shorts those below the average. It follows that the factor estimates $\hat{\lambda}_{0,t}$ and $\hat{\lambda}_{1,t}$ represent the time- t excess returns generated by the equally weighted and ESG portfolios, respectively.

One major contribution of Lioui & Tarelli (2022) was to develop a methodology to construct an ESG portfolio that was free from any look ahead bias. This was possible thanks to the use of lagged ESG scores (\mathbf{ESG}_{t-1}), which allowed to estimate the impact ESG scores had on performance over the next time period. Indeed, the weights of a portfolio so constructed are obtained at the beginning of the period ($t - 1$), while performance on that portfolio is evaluated at period-end (t).

Yet, one critical issue concerning the exposure of the portfolio to the ESG rating still requires further investigation. By construction, the ESG portfolio has an ex-ante exposure to the ESG factor of 1, and this is because multiplying the ESG portfolio weights by the ESG scores of the assets in the cross-section results in the following identity:

$$\frac{\mathbf{ESG}'_{t-1}}{\mathbf{ESG}'_{t-1} \mathbf{ESG}_{t-1}} \mathbf{ESG}_{t-1} = 1 \quad (3.7)$$

The result in Equation (3.7) holds regardless of the rating scale adopted: multiplying ESG ratings by a constant a will have no effect on the above relationship, as the constants cancel-out. Therefore, it means that the actual ESG rating of the portfolio is scale-dependent. The following example will clarify: assume three ESG data vendors employ different rating scales in the range 0-1, 0-10 and 0-100; then, a unitary exposure to the ESG rating can be interpreted into an actual ESG rating of 100, 10, and 1 on a 0-100 scale, respectively. Because this issue makes comparison among data providers problematic, ESG ratings were standardized at each cross-section. However, as pointed out earlier, when the rating scale changes, also the ESG rating of the portfolio does. Intuitively, the actual ESG rating of a portfolio of 100 stocks can be interpreted by the ESG rating of the 16th best ESG

⁸A zero-investment portfolio is generally referred to a portfolio with a net-value of zero, and hence requires no equity investment by the investor. Owing to condition (3.3), the weights of the ESG portfolio are, on average, zero

rated stock within the cross-sectional sample⁹.

3.2 Multivariate Cross-Sectional model

The MCS extension of the model was used to account for other stock characteristics. Indeed, the ESG factor is not likely to be the only driver of stock returns, and hence other factors shall be included to improve the regression. Most importantly, these factors should be included because they may have a strong correlation with the ESG factor, resulting in a distortion of the *pure* ESG portfolio towards exposure to other factors. For instance, this is the case of the market bias caused by size factor, according to which large market capitalization stocks get the highest ESG rating (Lioui, 2018). Clearly, this issue poses a threat to the interpretation of the alpha of the ESG portfolio, as the excess return may be caused by the size premium, rather than by the ESG premium itself. Hence, the scope of including additional stock characteristics is to neutralize the ex-ante exposure of the portfolio to them.

Next, the MCS model is introduced. Without loss of generality, the calculations underlying the MCS model are presented with one additional stock characteristic only, although extension to other factors is straightforward. The MCS model can be formulated as follows:

$$\mathbf{r}_t = \gamma_{0,t}\mathbf{1}_N + \gamma_{1,t}\mathbf{ESG}_{t-1} + \gamma_{2,t}\mathbf{C}_{t-1} + \boldsymbol{\epsilon}_t \quad (3.8)$$

where \mathbf{r}_t , $\mathbf{1}_N$ and \mathbf{ESG}_{t-1} are defined as in Equation (3.2), and \mathbf{C}_{t-1} is a $N \times 1$ vector that accounts for the additional characteristic. The vector of weights for the ESG portfolio is

$$\mathbf{w}_{MCS,t-1} = \frac{(\mathbf{C}'_{t-1}\mathbf{C}_{t-1})\mathbf{ESG}_{t-1} - (\mathbf{ESG}'_{t-1}\mathbf{C}_{t-1})\mathbf{C}_{t-1}}{(\mathbf{ESG}'_{t-1}\mathbf{ESG}_{t-1})(\mathbf{C}'_{t-1}\mathbf{C}_{t-1}) - (\mathbf{ESG}'_{t-1}\mathbf{C}_{t-1})^2} \quad (3.9)$$

and still has a long-short interpretation with an ESG exposure of 1. Furthermore, it can be proved that the portfolio ex-ante exposure to the additional characteristic

⁹This interpretation follows from the $(1 - \alpha)$ -level associated to the quantile $q_\alpha = 1$ for the standard normal distribution, where $(1 - \Phi(1)) \approx 16\%$

measured by $\mathbf{w}_{MCS,t-1}\mathbf{C}_{t-1}$ is zero, showing that the portfolio is neutral with respect additional independent variable.

Henceforth, the analysis in this paper will be based on the following five-factor extension of the MCS model:

$$\mathbf{r}_t = \gamma_{0,t}\mathbf{1}_N + \gamma_{1,t}\mathbf{ESG}_{t-1} + \gamma_{2,t}\mathbf{MC}_{t-1} + \gamma_{3,t}\mathbf{BM}_{t-1} + \gamma_{4,t}\mathbf{OP}_{t-1} + \gamma_{5,t}\mathbf{INV}_{t-1} + \epsilon_t \quad (3.10)$$

where the four stock characteristics represent size (\mathbf{MC}_{t-1}), value (\mathbf{BM}_{t-1}), profitability (\mathbf{OP}_{t-1}) and investments (\mathbf{INV}_{t-1}). Furthermore, the same formulation was iterated three times by using pillar-specific scores (either E, S or G) instead of the overall ESG score as the independent variable, in order to provide additional insights on the drivers of the ESG factor premium.

In summation, four MCS portfolios were constructed according to the methodology presented above, where the independent variable was either the overall ESG score or any pillar-specific score. These portfolios were analyzed with the scope of estimating the Jensen's alpha relative to their performance over the period considered, in order to draw conclusions on the existence of an ESG factor premium. Such analysis was performed through standard time-series regression, of which models (e.g. CAPM, Fama-French Five Factor model) have been widely documented in the literature.

Chapter 4

The ESG premium: Data and Results

This chapter is divided in two parts: the first section documents the data employed for the analysis, whereas the second presents the results obtained.

4.1 Data

The analysis of this paper focused on a sample of 441 stocks listed in the STOXX Europe 600 Index as of August 10th 2023 over an 8-year period (97 months) that ranged from 31-01-2015 to 31-01-2023. In addition, a subset of 323 stocks was used to investigate on the divergence of ESG scores among data providers.

The data retrieved for the construction ESG portfolios involved: i) ESG scores and ii) returns and additional stock characteristics.

4.1.1 ESG scores

The track record of overall ESG scores as well as pillar-specific scores was retrieved from two data providers: Bloomberg and Refinitiv. Both provided ESG scores on an annual basis and had similar stocks coverage, although the dataset of Bloomberg ESG scores was found to be the most complete as it provided up to date ESG data, while Refinitiv ESG scores relative to recent years (2022 and 2021) were missing for a number of stocks. This divergence led to the identification of two

different samples: the first sample was built exclusively with data provided by Bloomberg, including ESG scores of 441 stocks from 2015 to 2022; the second sample instead resulted in a subset of 323 stocks of the first sample from 2015 to 2021. This distinction was made in order to exploit the large and up to date availability of Bloomberg ESG data, aiming at reporting evidence on the most recent developments of the ESG premium, and at the same time develop insights on the sensitiveness of the results obtained to the ESG rating provider, by providing a "what-if" intuition if Refinitiv ESG scores were used instead.

Table 4.1 summarizes the distribution of Bloomberg ESG data employed in the first sample (summary statistics of the second sample for both Refinitiv and Bloomberg ESG scores are reported in Appendix A) .

	ESG							E						
Year	Mean	Std	Min	25%	50%	75%	Max	Mean	Std	Min	25%	50%	75%	Max
2022	4.49	1.22	0.74	3.63	4.52	5.36	7.96	4.18	2.09	0.00	2.72	4.35	5.65	10.00
2021	4.45	1.22	0.76	3.58	4.48	5.32	7.96	4.11	2.06	0.00	2.67	4.26	5.58	10.00
2020	4.12	1.24	0.81	3.18	4.09	5.04	7.93	3.53	2.13	0.00	1.84	3.54	5.19	9.54
2019	3.79	1.20	0.62	2.87	3.77	4.70	7.12	3.09	2.17	0.00	1.17	3.00	4.86	9.75
2018	3.50	1.18	0.60	2.50	3.52	4.35	7.17	2.70	2.16	0.00	0.61	2.61	4.30	9.05
2017	3.34	1.17	0.63	2.38	3.29	4.21	7.18	2.48	2.09	0.00	0.51	2.15	3.99	8.91
2016	3.08	1.14	0.63	2.19	2.99	3.90	6.88	2.25	1.99	0.00	0.34	1.89	3.59	8.95
2015	2.85	1.11	0.54	1.98	2.75	3.59	6.70	2.05	1.91	0.00	0.23	1.67	3.32	9.07
	S							G						
Year	Mean	Std	Min	25%	50%	75%	Max	Mean	Std	Min	25%	50%	75%	Max
2022	3.49	1.83	0.00	2.16	3.22	4.70	9.57	6.59	1.14	2.93	5.80	6.66	7.48	8.73
2021	3.46	1.84	0.00	2.06	3.19	4.70	9.57	6.61	1.14	3.23	5.80	6.63	7.50	8.90
2020	3.23	1.80	0.00	1.86	2.93	4.34	9.26	6.54	1.16	3.14	5.76	6.59	7.46	8.88
2019	2.94	1.66	0.00	1.67	2.63	3.89	9.38	6.40	1.18	3.06	5.58	6.50	7.29	8.55
2018	2.73	1.60	0.00	1.56	2.36	3.62	8.00	6.23	1.21	3.03	5.42	6.28	7.14	8.63
2017	2.59	1.62	0.00	1.37	2.23	3.36	8.00	6.13	1.20	2.45	5.22	6.17	7.13	8.63
2016	2.28	1.56	0.00	1.11	1.91	3.11	8.00	5.97	1.31	2.32	4.97	6.08	7.01	8.80
2015	1.99	1.45	0.00	0.94	1.62	2.69	7.89	5.80	1.37	2.08	4.74	5.81	6.95	8.60

Table 4.1: Summary Statistics for Bloomberg ESG data on 441 stocks

4.1.2 Returns and other stock characteristics

Data relative to stock returns and additional characteristics was all retrieved on a monthly basis from Bloomberg over the period spanning from 2015-01-31 to 2022-12-31, with the only exception of the excess returns time-series that was extended to include also for the 31-01-2023 observation. When readily available, the variables were directly imported from Bloomberg, whereas those that were not were constructed through the combination of more variables. Further, the risk-free rate was retrieved from Kenneth French online library¹⁰. In detail, the variables were so constructed:

- **Returns.** Stocks' excess returns were computed through the Total Return Index (TRI) and the risk-free rate according to the following formula:

$$r_{i,t} = \frac{TRI_{i,t} - TRI_{i,t-1}}{TRI_{i,t-1}} - r_{f,t} \quad (4.1)$$

- **MC.** Market capitalization of stocks was directly provided by Bloomberg.
- **BM.** The Book-to-Market ratio was obtained from the Bloomberg Market-to-Book ratio and adjusted accordingly, hence:

$$BM_{i,t-1} = \frac{1}{\text{Market-to-Book ratio}_{i,t-1}} \quad (4.2)$$

- **OP.** Operating profitability was computed as the ratio between Net Operating Profits After Taxes (NOPAT) and Total Equity, thus:

$$OP_{i,t-1} = \frac{\text{NOPAT}_{i,t-1}}{\text{Total Equity}_{i,t-1}} \quad (4.3)$$

- **INV.** Investments of a firm were measured in relative terms by the ratio of Total Assets for the period over Total Assets on the previous period:

$$INV_{i,t-1} = \frac{\text{Total Assets}_{i,t-1}}{\text{Total Assets}_{i,t-2}} \quad (4.4)$$

¹⁰Available at: https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

Summary statistics of the stock characteristics are reported in Appendix B.

4.2 Results

The four *pure* ESG portfolios calculated according to the MCS methodology are analyzed in this section. Recall that these portfolios were constructed to gain exclusive exposure to the ESG factor, either it being the overall ESG score or the E, S or G pillar specific-score provided by Bloomberg. The analysis of their performance over the period considered sheds light on how the market has priced ESG information, and on whether there is sufficient empirical evidence to conclude for an ESG premium. Further, it is shown that these portfolios are strongly dependent on the ESG data provider, as the extent of subjectivity involved in the assessment of a company's ESG performance is playing a significant role on the final score, which represent the independent variable on which ESG portfolios are based.

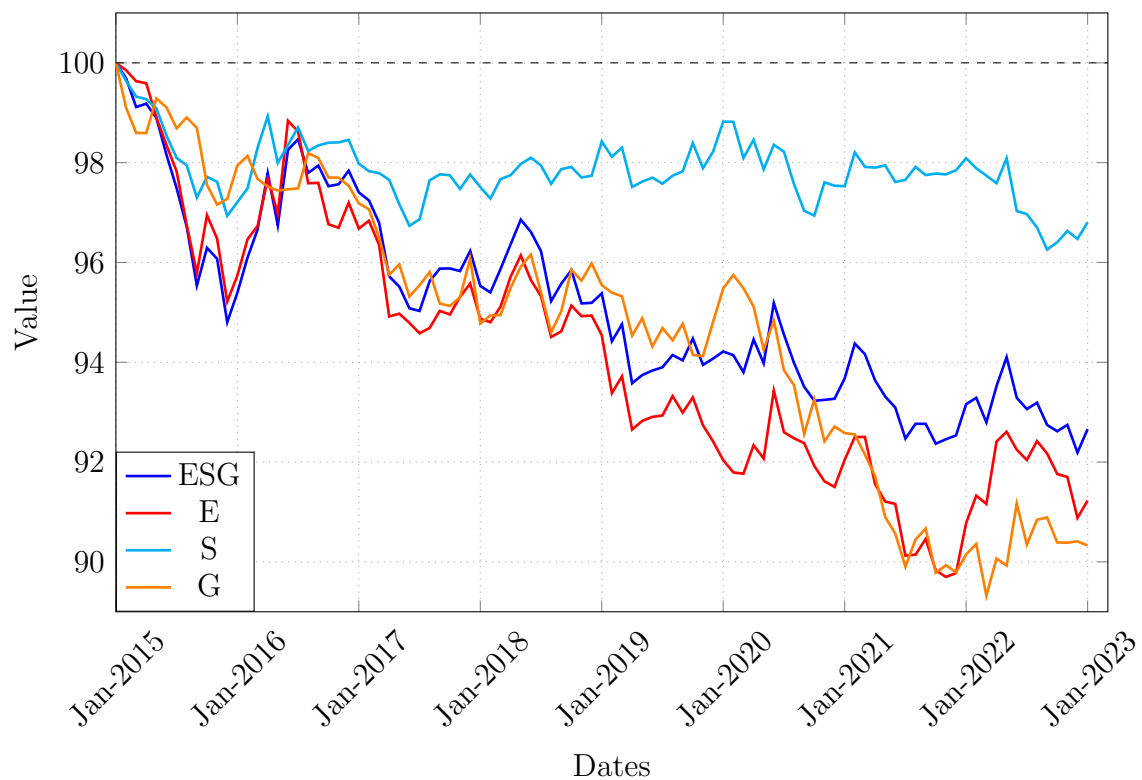


Figure 4.1: Performance of ESG portfolios

4.2.1 ESG premium

A first investigation on the performance of the ESG portfolios suggests the case for an ESG premium is well-grounded, although in support of a negative relationship. Figure 4.1 shows that all ESG portfolios have lost value over time: the ESG portfolio exhibited a negative total return of -7.34%, and an even worse performance was achieved by E and G portfolios; the S portfolio performed better than the other three, but still ended up losing almost 3.20% of its value.

Evidence for a negative ESG premium is backed by the statistically significant estimates of Jensen's alpha obtained from time-series regressions on the two main asset pricing models, CAPM and Fama-French 5 Factor model (FF5). A summary of the regression estimates for each portfolio is provided in Table 4.2. The esti-

	ESG			E		
	Coef	Std Err	$P > z $	Coef	Std Err	$P > z $
α_{CAPM}	-0.0016	0.001	0.011	-0.0015	0.001	0.032
β_{CAPM}	0.0069	0.012	0.568	-0.0089	0.015	0.559
α_{FF5}	-0.0017	0.001	0.003	-0.0017	0.001	0.008
β_{MKT}	0.0122	0.013	0.331	-0.0016	0.016	0.920
β_{SMB}	0.0399	0.024	0.092	0.0434	0.030	0.145
β_{HML}	-0.0041	0.023	0.859	-0.0160	0.028	0.571
β_{RMW}	-0.0133	0.027	0.620	-0.0158	0.033	0.631
β_{CMA}	0.0972	0.037	0.009	0.1168	0.042	0.005
	S			G		
	Coef	Std Err	$P > z $	Coef	Std Err	$P > z $
α_{CAPM}	-0.0013	0.000	0.001	-0.0014	0.001	0.011
β_{CAPM}	0.0249	0.009	0.006	-0.0545	0.013	0.000
α_{FF5}	-0.0013	0.000	0.001	-0.0013	0.001	0.014
β_{MKT}	0.0278	0.009	0.002	-0.0652	0.014	0.000
β_{SMB}	0.0115	0.015	0.454	0.0497	0.024	0.038
β_{HML}	0.0169	0.015	0.260	0.0197	0.021	0.339
β_{RMW}	-0.0101	0.019	0.594	0.0145	0.028	0.600
β_{CMA}	0.0386	0.024	0.111	-0.0040	0.032	0.901

Note: Statistically significant estimates at the 1%-level are highlighted in bold

Table 4.2: Regression estimates for ESG, E, S, and G portfolios

mated alphas are both significant and negative for all the four portfolios, regardless

of the asset pricing model employed. Indeed, the Fama-French multi-factor extension of the CAPM was not expected to produce significantly different estimates of the alpha, because the ex-ante exposure of ESG portfolios to additional characteristics was neutralized. This idea is consistent with non-significant beta estimates: portfolios' returns were unlikely to be explained by the included variables. In this regard, the interpretation of the beta estimate of the CMA factor is trivial: although significant for both the ESG and E portfolio, there seems to be no reason on why the CMA factor should have a causal relationship on the portfolios.

Overall, the CAPM and FF5 regression analysis provide empirical evidence of a negative ESG premium: the annually adjusted¹¹ ESG premium equals -1.90% when the CAPM is used, and it decreases to -2.02% under the FF5 model.

On top of this, it is important to highlight the correlation between portfolios as seen in Figure 4.1. The performance trajectories of the ESG, E, and G portfolios closely mirrored each other, suggesting a strong resemblance in the weights assigned by these portfolios. This resemblance was reflected in a significant correlation, as evidenced by a high ρ value of 0.974 between the ESG and E portfolios (as shown in Table 4.3). Because the ESG score is the end product of a weighted

	ESG	E	S	G
ESG	1.000	0.974	0.726	0.888
E		1.000	0.603	0.877
S			1.000	0.623
G				1.000

Table 4.3: Correlation Matrix

combination of pillar-specific scores, a high correlation between an ESG portfolio and any pillar-specific portfolio could be expected. However, the 0.877 correlation between the E and G portfolio is suspicious, and it raises question on how performance relative to the two metrics is actually evaluated: why two portfolios constructed on completely different metrics behave so similarly? In theory, the E and G scores should be unrelated, as their aim is to rate a company's commitment in two unrelated fields. From a practical point of view, such a high correlation can

¹¹The alpha estimate is relative to the portfolio's monthly return. To convert the alpha on an annual basis, the following adjustment shall be made: $\alpha_{ann} = (1 + \alpha_{month})^{12} - 1$

be traced back to the "halo-effect" documented by Berg et al. (2022), according to which pillar-specific scores are not assigned independently.

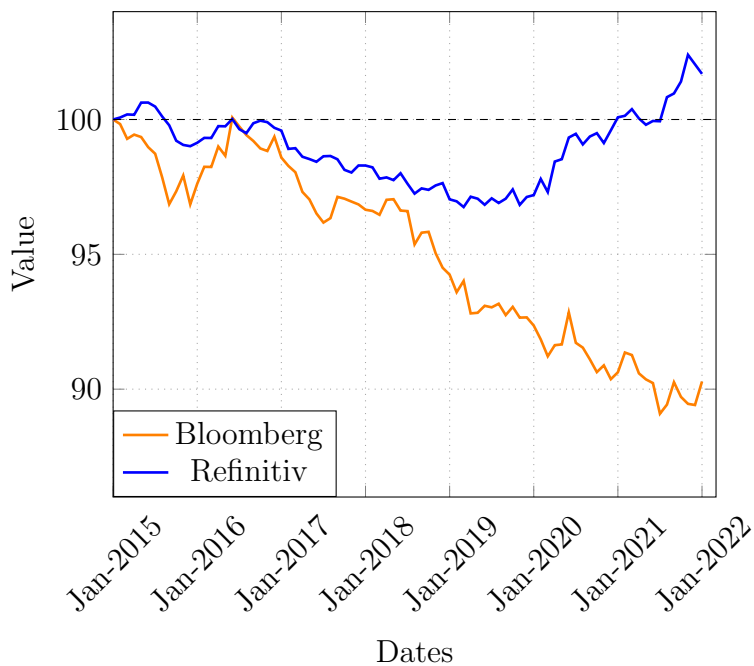
4.2.2 Confusion data

This last section develops on the major challenge on ESG: the inconsistency in results driven by different ESG data providers. Although empirical evidence of a negative ESG premium was documented in the previous section, the lack of standardised practices in ESG reporting made ESG scores strongly dependent on the data provider, which proposes its own subjective assessment of a company ESG performance; hence, the same applies to the results obtained, which should carefully interpreted and possibly replicated with other providers' ESG data.

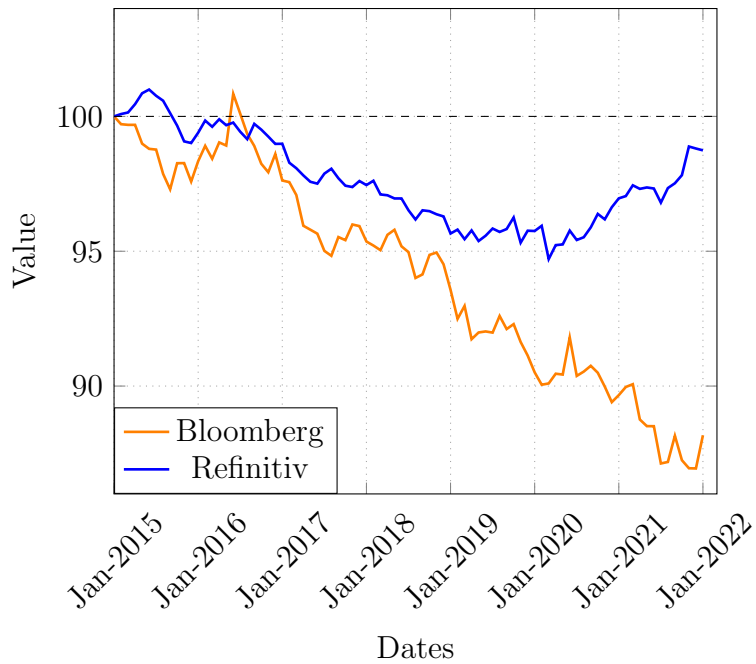
This study analyzed the disagreement among data providers by retrieving ESG scores from Bloomberg and Refinitiv. Then, it used the two dataset to replicate the methodology discussed in this paper and construct the four ESG portfolios. The comparison of ESG portfolios by data provider (depicted in Figure 4.2) makes it clear that a strong divergence exist between data providers. In fact, ESG portfolios were very different from one provider to the other: not only they exhibited poor correlation, but appeared to be negatively correlated, in particular when looking at portfolios' performance from January 2019 on. Indeed, it is clear that using Refinitiv scores would have led to a different regression outcome, possibly resulting in a positive ESG premium.

When ESG ratings diverge to such an extent, doubts on their reliability arise. In this scenario investors often mistrust the provider's assessment of ESG performance; but even worse is the fact that investors who wish to make an impact through their allocation of capital could be exposed to completely different portfolios just because they disposed of different ESG data sources.

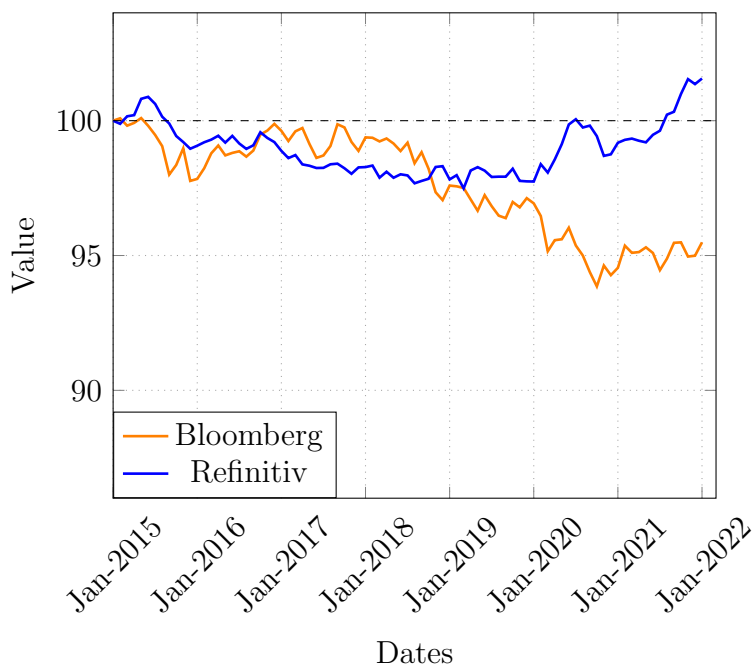
ESG portfolios



E Portfolios



S portfolios



G portfolios

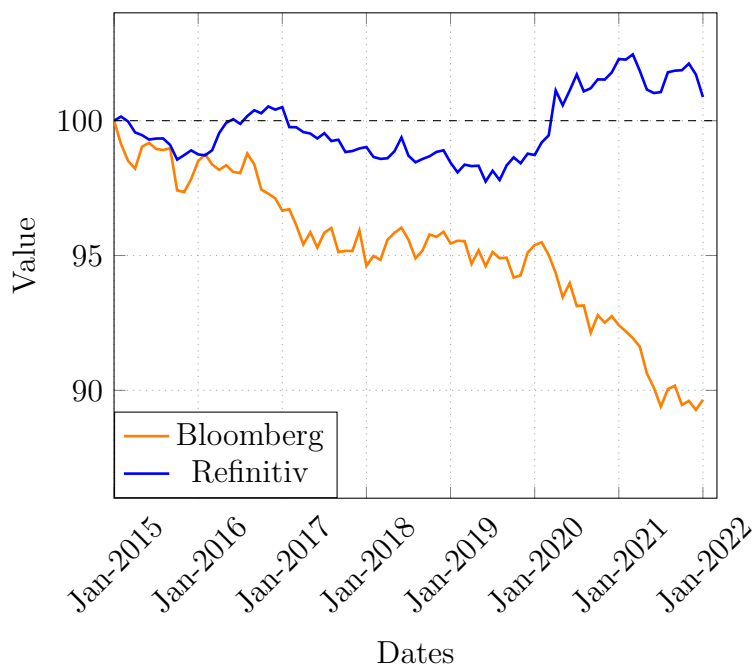


Figure 4.2: ESG portfolios by data provider

Conclusions

The adoption of ESG reporting represents a significant step towards the promotion of sustainable development. However, it is essential to recognize that while assigning performance scores to corporations may incentivize positive actions, it is not without its drawbacks. ESG scores can become the primary focus for businesses, leading them to undertake actions solely for the purpose of improving their ESG reputation. This focus on scores may not always align with genuine, holistic sustainability efforts, and in some cases, firms may abstain from sustainability initiatives if the outcomes cannot be directly attributed to a significant ESG score improvement.

This paper has contributed valuable evidence regarding the existence of a negative ESG premium, shedding light on the financial implications of ESG performance. Nevertheless, it has also exposed the limitations associated with ESG scores that are provider-dependent. These limitations could potentially lead to contrasting results and make it challenging to determine how the market has truly priced the ESG factor. This ambiguity is primarily a result of the lack of uniformity in ESG performance measurement across different providers and stakeholders.

In the face of these challenges, the need for standardized and consistent ESG reporting becomes apparent. As we move forward, it is essential for researchers, regulators, and businesses to address these issues collaboratively. Future research should explore methods for harmonizing ESG reporting practices, enhancing the transparency of data, and developing robust frameworks that more accurately reflect a corporation's actual commitment to sustainability.

Appendix A

	ESG							E						
Year	Mean	Std	Min	25%	50%	75%	Max	Mean	Std	Min	25%	50%	75%	Max
2021	4.28	1.19	0.76	3.39	4.30	5.10	7.96	3.91	2.18	0.0	2.38	3.92	5.42	10.00
2020	3.95	1.22	0.81	3.02	3.95	4.70	7.93	3.29	2.22	0.0	1.50	3.00	5.02	9.54
2019	3.61	1.16	0.62	2.68	3.57	4.46	7.03	2.84	2.26	0.0	0.72	2.57	4.47	9.75
2018	3.31	1.14	0.60	2.42	3.21	4.07	7.17	2.43	2.24	0.0	0.43	1.92	4.00	9.05
2017	3.15	1.13	0.63	2.26	3.03	3.84	7.18	2.21	2.15	0.0	0.33	1.61	3.58	8.91
2016	2.91	1.10	0.63	2.10	2.79	3.59	6.88	2.02	2.07	0.0	0.22	1.43	3.22	8.95
2015	2.69	1.08	0.54	1.87	2.56	3.28	6.70	1.85	1.99	0.0	0.07	1.31	2.88	9.07
	S							G						
Year	Mean	Std	Min	25%	50%	75%	Max	Mean	Std	Min	25%	50%	75%	Max
2021	3.29	1.77	0.0	1.98	3.02	4.22	9.23	6.59	1.14	3.23	5.78	6.63	7.50	8.90
2020	3.06	1.74	0.0	1.74	2.70	4.04	9.26	6.54	1.17	3.14	5.76	6.59	7.52	8.88
2019	2.75	1.56	0.0	1.58	2.43	3.60	9.38	6.41	1.18	3.06	5.54	6.50	7.28	8.55
2018	2.55	1.47	0.0	1.52	2.16	3.44	7.50	6.24	1.22	3.03	5.40	6.27	7.22	8.63
2017	2.39	1.50	0.0	1.31	2.02	3.18	7.89	6.14	1.20	2.45	5.22	6.13	7.12	8.63
2016	2.07	1.43	0.0	1.02	1.72	2.74	7.89	6.00	1.30	2.32	4.98	6.11	7.00	8.80
2015	1.81	1.36	0.0	0.90	1.45	2.38	7.89	5.84	1.35	2.08	4.82	5.80	6.96	8.60

Table 4: Summary Statistics for Bloomberg ESG data on 323 stocks

	ESG							E						
Year	Mean	Std	Min	25%	50%	75%	Max	Mean	Std	Min	25%	50%	75%	Max
2021	74.82	12.39	27.56	68.76	76.73	83.94	95.51	72.16	18.61	13.57	63.08	76.46	86.33	98.92
2020	73.41	13.64	17.56	66.47	75.44	83.25	95.15	70.61	20.39	8.22	59.65	76.14	85.30	99.12
2019	70.65	14.51	13.31	63.22	72.58	81.24	95.21	68.83	21.87	0.00	57.22	74.59	85.43	98.89
2018	68.32	15.95	8.14	59.42	70.91	80.12	94.96	65.83	23.60	0.00	50.46	72.59	84.26	98.85
2017	66.07	16.74	7.49	55.91	68.68	79.00	95.74	64.67	24.06	0.00	51.18	70.74	83.65	98.46
2016	63.57	17.62	6.05	53.18	65.07	77.43	92.06	64.59	23.52	0.00	48.92	69.09	83.78	98.07
2015	61.98	19.03	5.98	50.90	65.12	76.40	93.51	63.42	24.79	0.00	48.67	67.44	84.08	98.24
	S							G						
Year	Mean	Std	Min	25%	50%	75%	Max	Mean	Std	Min	25%	50%	75%	Max
2021	76.67	15.15	25.86	67.91	79.46	88.81	98.31	73.57	16.32	23.64	64.65	76.75	86.82	98.56
2020	75.65	16.04	11.87	65.82	78.86	88.46	97.95	71.58	17.77	9.97	62.99	75.49	84.38	98.34
2019	74.12	16.91	14.61	65.00	78.06	86.68	98.18	66.28	18.96	8.11	55.16	69.40	80.65	98.14
2018	72.45	17.92	5.29	62.89	75.64	86.90	97.34	63.52	20.83	9.32	50.00	67.08	79.27	97.34
2017	71.06	19.06	2.30	59.94	74.67	85.70	97.92	58.82	21.75	5.18	42.49	62.14	74.96	97.26
2016	67.82	21.06	2.06	54.18	73.07	84.40	97.64	57.11	21.72	4.50	42.10	59.92	73.50	97.27
2015	65.42	22.45	2.16	50.98	69.84	84.62	97.96	56.34	22.36	5.40	40.02	59.24	74.17	94.49

Table 5: Summary Statistics for Refinitiv ESG data on 323 stocks

Appendix B

	MC							BM						
Year	Mean	Std	Min	25%	50%	75%	Max	Mean	Std	Min	25%	50%	75%	Max
2022	4.683	11.975	0.164	0.594	1.392	4.307	181.084	0.676	0.601	-1.176	0.264	0.507	0.922	3.373
2021	4.752	9.904	0.162	0.685	1.546	4.487	129.906	0.574	0.569	-1.867	0.207	0.420	0.777	4.134
2020	3.713	7.550	0.031	0.563	1.247	3.600	99.280	0.739	0.836	-1.275	0.240	0.498	0.926	6.320
2019	3.746	7.083	0.069	0.595	1.392	3.830	83.534	0.603	0.555	-0.144	0.228	0.447	0.783	4.212
2018	3.605	6.778	0.079	0.610	1.309	3.944	73.548	0.549	0.448	-0.222	0.233	0.432	0.748	3.324
2017	3.656	6.812	0.034	0.583	1.403	3.869	76.433	0.508	0.393	-0.264	0.231	0.376	0.711	2.695
2016	3.220	6.265	0.031	0.494	1.158	3.459	73.185	0.580	0.517	-0.328	0.248	0.417	0.805	4.602
2015	3.240	7.035	0.058	0.441	1.132	3.313	96.762	0.547	0.442	-0.298	0.249	0.409	0.736	2.938

	OP							INV						
Year	Mean	Std	Min	25%	50%	75%	Max	Mean	Std	Min	25%	50%	75%	Max
2022	0.013	0.446	-6.005	0.030	0.050	0.087	1.365	1.007	0.014	0.925	1.000	1.005	1.011	1.111
2021	0.077	0.669	-8.318	0.030	0.052	0.096	9.741	1.009	0.014	0.950	1.002	1.006	1.012	1.106
2020	0.051	0.243	-2.413	0.021	0.040	0.074	3.055	1.005	0.015	0.979	0.998	1.002	1.008	1.149
2019	0.113	0.696	-3.637	0.029	0.051	0.091	12.115	1.010	0.018	0.971	1.003	1.006	1.013	1.180
2018	0.076	0.376	-3.907	0.032	0.053	0.092	4.233	1.009	0.028	0.982	1.001	1.005	1.009	1.439
2017	0.119	0.482	-0.248	0.033	0.055	0.092	7.355	1.004	0.016	0.977	0.998	1.002	1.006	1.215
2016	0.115	0.502	-0.901	0.029	0.052	0.091	9.012	1.008	0.020	0.956	1.001	1.006	1.011	1.343
2015	0.106	0.824	-6.228	0.027	0.050	0.091	13.919	1.004	0.013	0.966	0.997	1.002	1.008	1.111

Table 6: Summary Statistics for Bloomberg stock characteristics data on 441 stocks

	MC							BM						
Year	Mean	Std	Min	25%	50%	75%	Max	Mean	Std	Min	25%	50%	75%	Max
2021	5.227	10.941	0.162	0.751	1.738	5.356	129.906	0.582	0.627	-1.867	0.185	0.391	0.794	4.134
2020	4.119	8.365	0.031	0.605	1.392	4.181	99.280	0.758	0.924	-1.275	0.207	0.453	0.971	6.320
2019	4.231	7.868	0.069	0.670	1.577	4.352	83.534	0.597	0.598	-0.144	0.207	0.431	0.788	4.212
2018	4.086	7.547	0.079	0.678	1.567	4.504	73.548	0.534	0.479	-0.222	0.222	0.391	0.716	3.324
2017	4.177	7.594	0.034	0.624	1.556	4.511	76.433	0.487	0.409	-0.264	0.220	0.353	0.651	2.695
2016	3.694	7.002	0.031	0.538	1.332	3.685	73.185	0.559	0.547	-0.328	0.232	0.384	0.719	4.602
2015	3.732	7.868	0.061	0.487	1.354	3.895	96.762	0.515	0.435	-0.298	0.228	0.378	0.661	2.467

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Year	Mean	Std	Min	25%	50%	75%	Max	Mean	Std	Min	25%	50%	75%	Max
2021	0.083	0.781	-8.318	0.030	0.054	0.106	9.741	1.007	0.013	0.950	1.001	1.006	1.010	1.106
2020	0.056	0.283	-2.413	0.022	0.040	0.082	3.055	1.004	0.012	0.979	0.998	1.002	1.008	1.089
2019	0.139	0.811	-3.637	0.031	0.058	0.100	12.115	1.010	0.017	0.977	1.003	1.007	1.012	1.140
2018	0.085	0.439	-3.907	0.033	0.057	0.099	4.233	1.008	0.021	0.982	1.001	1.004	1.009	1.258
2017	0.143	0.561	-0.248	0.034	0.060	0.099	7.355	1.005	0.018	0.977	0.998	1.002	1.006	1.215
2016	0.137	0.582	-0.901	0.031	0.057	0.100	9.012	1.007	0.013	0.956	1.001	1.005	1.011	1.065
2015	0.125	0.961	-6.228	0.027	0.053	0.099	13.919	1.003	0.010	0.966	0.997	1.002	1.008	1.068

Table 7: Summary Statistics for Bloomberg stock characteristics data on 323 stocks

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