



Research article

The causation dilemma in ESG research

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Abstract: The ESG literature suggests that the relationship between a firm's environmental, social, and governance (ESG) performance and a firm's financial performance is positive, but the causal link between these two variables is ambiguous. The results in this study mirrored that sentiment of the ESG literature; thus, the purpose of this article is to frame the causal ambiguity in ESG research that accounts for ambiguous conclusions in ESG literature. This study found that firms with complete Bloomberg ESG ratings had higher abnormal returns than firms without complete ESG ratings, but the actual rating did not correlate with abnormal returns. Similarly, this study found that firms with higher ESG disclosure scores (regardless of whether the disclosures were good or bad) were associated with higher abnormal returns, which further illustrates the ambiguity and suggests transparency as a clarifying factor. While much of the literature notes challenges in ESG research, this study is one of the first that frames the confusing causal link between ESG performance and financial performance as the key conclusion of the study.

Keywords: ESG; ESG ratings; stock performance; abnormal returns

JEL Codes: G11

1. Introduction

Today's investors demand investments that are environmentally friendly, socially responsible, and ethically governed, and ESG investing has filled this need. Recent academic research has suggested that investors do not need to choose between doing good and doing well—ESG investing promises to do both. Driven by this investor demand and a framework focused on financial value, ESG investing has become hugely popular in recent years. The Global Sustainable Investment Alliance (GSIA) reports that as of 2020, there are \$35.3 trillion of managed assets globally that consider ESG factors in investment decisions, which amounts to 35.9% of all professionally managed assets (GSIA, 2020). The \$35.3 trillion is a 15% increase since 2018 and a 55% increase since 2016 (GSIA, 2020). King and Pucker (2022) calculate that investors contribute over \$3 billion to ESG investments each day. The popularity of ESG investing calls for quality research, and there has been a plethora of ESG studies in recent years (Berg et al., 2021; Christensen et al., 2022).

ESG investing includes several categories, the most common of which is referred to as ESG integration (GSIA, 2020), which means that investment managers consider ESG issues in their investment decisions. ESG integration is similar to traditional investing (van Duuren et al., 2016) as ESG risks are considered in the same way as other risks that would affect valuation and buy or sell decisions. Other ESG investment strategies in the order of total assets under management include negative screening (excluding investments based on activities of the company, industry, or region), corporate engagement and shareholder action (using shareholder power to change corporate behavior), norms-based screening (screening investments against minimum ESG-related norms), and sustainability-themed investment (investing in assets that contribute to sustainability) (GSIA, 2020).

Contemporary ESG investing started as exclusionary screening in the 1970s, and it was driven by religiously motivated investors who avoided investment in “sin stocks” such as alcohol or tobacco (Martini, 2021). Socially responsible investing (SRI) became a mainstream, positive screening strategy in the 1990s (Martini, 2021). The MSCI KLD 400 (one of the first SRI indexes) was launched in 1990, and it invests in firms with superior ESG ratings and excludes firms and products with negative environmental and social impacts (Martini, 2021). King and Pucker (2022) explains that the first stage of positive screening was termed a “deep green” investment strategy because it required a difficult analysis of each company. The “deep green” strategy gave way to a “light green” strategy in the 2000s when investors had access to more readily available public information on sustainable companies (King and Pucker, 2022). The abundance of available ESG information in the 2010s combined with the use of computer algorithms made it easier for more funds to invest with ESG criteria; as a result, the number of ESG funds has increased fivefold in the past decade, and investments in ESG funds from 2020 to 2022 have been double those of other stock investments (King and Pucker, 2022).

The aim of this study is to understand the relationship between a firm's ESG performance and the firm's financial performance. The literature reviewed here suggests positive correlations between ESG performance and financial performance, but there are numerous areas of ambiguity, and this article contends that that ambiguity is due to the lack of clarity about causation. The cause of better financial performance could be due to higher ESG ratings, simply having ESG ratings, ESG initiatives, quality leadership, transparency, investor demand, changes in any of those variables, or other factors. The gap in understanding causation has contributed to conflicting study results in a field that is already rife with

methodological pitfalls. Other methodological challenges include the lack of standardized ratings, the lack of ratings for many companies, ratings that are primarily based on company disclosures, the question of materiality of ratings to specific companies, non-linear correlations, and changing correlations over time. Unfortunately, this article cannot announce exactly which ESG factor(s) cause better financial performance, nor can this article clarify all of the methodological challenges in the ESG field. However, this article seeks to frame the causation dilemma in an effort to better understand the confusing empirical results in ESG research.

This study illustrates the causation dilemma by comparing abnormal returns of ESG-rated firms with the abnormal returns of non-rated firms. This study finds that merely having a Bloomberg ESG rating (regardless of whether the rating is good or bad) is correlated with higher abnormal returns. Firms with ESG ratings had abnormal returns of more than 10% higher over the two-year study period. This result begs questions such as: Does ESG performance cause higher returns? Does merely having ESG ratings cause higher returns? Does a different factor such as good company management lead to both ESG ratings and higher returns? The only definitive conclusion in this regard is that higher abnormal performance is driven by factors that are not captured by differences in current ESG ratings. This article also finds that firms with higher ESG disclosure scores have higher abnormal returns regardless of whether the firms have disclosed good or bad ESG information. This result also leads to more questions than it answers; ultimately, this article asserts that specific causation answers are not available in the ESG space at this time, but that does not negate the positive correlation between ESG performance and financial performance.

The lack of a clear causation contributes to the contradictory results in the literature, and identifying the causation gap and the confusion it has caused is the key goal and contribution of this study. The broad research question for this study is: How is ESG performance related to financial performance? While this study looks specifically at ESG ratings, ESG disclosure scores, and abnormal returns, the analysis in our literature review and the results of our methodology quickly illustrate a larger, more important question of the causation gap. An article that clearly frames this shortcoming of the ESG space is important for future researchers as they design methodology, interpret results, and inform rating agencies of the true causation of better returns for ESG companies.

The next section in this article explores the ESG literature; the positive relationship between ESG performance and financial performance is clear in the literature review, but a notable number of studies produce different conclusions. Thus, the debate about the value of ESG performance continues. The methodology outlines this study's use of ESG ratings, ESG disclosure scores, and abnormal returns. The results section begins the formulation of this study's key contribution—the results support the positive relationship between ESG performance and financial performance but not by a direct relationship between ratings and returns. Thus, the causation gap becomes the central contribution of this article. This conclusion is explored in detail in the Conclusion section followed by limitations and future research opportunities.

2. Literature review

The ESG literature points to a positive relationship between ESG performance and financial performance, and that literature seems to have driven the rapid growth in ESG investing discussed in the introduction. However, some ambiguity in the literature remains; in fact, some studies point to a negative correlation. While there may be a positive correlation between ESG performance and financial performance, there is minimal understanding of causation, which leads to conflicting results in a field that already faces methodological challenges. The most notable methodological challenges are ratings and the materiality of ratings. Much of the literature questions the quality and subjectivity of ESG ratings; furthermore, some of the literature questions whether the materiality of ESG ratings has been properly applied to specific industries and/or specific companies.

2.1. Literature that demonstrates a positive correlation

An article by Khan et al. (2016) was an important development in ESG investing. Khan et al. (2016) found that firms with good (and material) ESG performance earned higher returns than firms with bad (and material) ESG performance. This finding has often been credited with fueling the explosion in ESG investing (King and Pucker, 2022). Khan et al. (2016) also found that firms with good ESG ratings on immaterial factors do not underperform, which suggests no negative effect of company ESG initiatives. Lastly, Khan et al. (2016) found the best performance for firms with high ESG ratings on material issues and low ESG ratings on immaterial issues, which suggests high returns for firms that efficiently and wisely invest in sustainability investments. Khan et al. (2016) claims to be the first study to address the important issue of materiality, and the authors assert that prior research failed to find a link between ESG performance and financial performance in part because of the failure to understand which ESG ratings were material to which firms. The materiality of ESG scores varies by industry (Eccles and Serafeim, 2013 as cited in Khan et al., 2016). For example, the environmental scores could be highly material for energy companies but not material for media companies. A follow-up paper by Khan (2019) expands the research of the study in 2016 and again demonstrates the return potential of high ESG ratings (after a detailed consideration of the materiality).

A meta-study by Whelan et al. (2021) is noteworthy because it assessed over 1000 ESG studies from 2015 to 2020. The content in Whelan et al. (2021) was developed from an earlier working paper by a different lead author (Atz et al., 2020) and would be later evolved and published in the *Journal of Sustainable Finance and Investment* (the mentioned work by Atz et al. (2022) will be discussed below), but the conclusions of Whelan et al. (2021) stand on their own as work published by the NYU Stern Center for Sustainable Business and Rockefeller Asset Management. Whelan et al. (2021) affirmed a positive correlation between ESG performance and financial performance. The study found that ESG research before 2015 generally showed positive correlations between ESG and financial performance, and those studies led to rapid ESG investing growth. Whelan et al. (2021) asserted that ESG studies decidedly point toward a positive or neutral correlation between ESG performance and financial performance, and that studies since 2015 show a more conclusive positive correlation than studies before 2015. Whelan et al. (2021) also conducted a meta-meta-analysis by reviewing 13 corporate-focused meta-studies and 2 investor-focused meta-studies. Whelan et al. (2021) found that the corporate-focused

meta-studies show positive correlations between ESG and financial performance and the investor-focused meta-studies show no correlation between ESG and financial performance. The last finding does not derail the authors' enthusiasm for their overall conclusion, and they seem to ignore it because the neutral conclusion does not refute their finding.

A study by Galema and Gerritsen (2022) discussed several of the different channels by which ESG performance could affect financial performance. The study found that ESG rating decreases are followed by decreases in annualized abnormal returns of 3% because: institutional investors decrease holdings, sustainable indices may exclude downgraded firms, and rating downgrades increase systematic risk, which decreases firm valuations. But, generally, in the ESG investing space, Galema and Gerritsen (2022) noted that positive (or negative) ESG performance could be reflected in positive (or negative) financial performance by channels such as non-financial investor tastes, ESG news events, releases of sustainability reports, investor characteristics, corporate social responsibility (CSR) activities, transparency, or varying levels of concern for the individual E, S, or G factors. Some of the studies mentioned by Galema and Gerritsen (2022) will be further explored here.

Many studies have found that ESG-related news events or information releases are likely to affect firm valuation. Capelle-Blancard and Petit (2019) found that negative ESG news events decrease a firm's stock value by an average of 0.1% per negative event (with no effect for positive events). Aureli et al. (2020) asserted that market reactions to sustainability reports indicate that ESG information is price relevant, and the study found two significant event window market reactions and an increasing level of significance since 2013; both results support the value relevance of ESG data.

ESG activities could affect stock returns due to investor preference and loyalty. Galema and Gerritsen (2022) noted that non-financial investor preferences for sustainable firms can increase demand and thus valuation for those firms (Fama and French, 2007); thus, as investor preferences for sustainable firms increase (as they have in recent years), valuations of those firms increase (Pastor et al., 2021). Similarly, Albuquerque et al. (2020) showed that investor (as well as customer) loyalty to sustainable firms decreased stock volatility and increased stock returns of companies with higher environmental and social ratings during the market crash in the first quarter of 2020. Another non-financial channel that may affect value is diversity management and related diversity disclosures. Bloomberg ESG scores are higher for firms with more women on the board, more board independence, and larger boards (Bloomberg¹), and Shohaieb et al. (2022) found that those three factors are in fact related to more diversity management and related diversity disclosures. Shohaieb et al. (2022) did not test financial performance but instead suggested benefits of diversity management.

Rating changes seem to influence company valuations, notably ratings downgrades. Guest and Nerino (2020) found that governance rating downgrades were associated with a stock market decrease of 1.14% over a three-day window. Shanaev and Ghimire (2021) found that ESG rating downgrades led to a decrease in risk-adjusted returns of 1.2%; the study found evidence (though not statistically significant evidence) that rating upgrades led to positive abnormal returns. Berg et al. (2022) found that downgrades resulted in negative abnormal returns of 2.37% in the following year; upgrades resulted in a weaker positive effect. Berg et al. (2022) found that rating downgrades reduced holdings by US ESG funds, and upgrades increased holdings, but the slow response in ownership change

¹ Bloomberg ESG Disclosure Model. Bloomberg L.P. accessed May 2022.

suggested that fund managers do not consider the rating changes reflective of fundamental value; instead, the fund managers seem to be complying with ESG mandates. Interestingly, the study found that among the major ESG raters, only MSCI ESG explains variation in holdings of US ESG funds. Also, Berg et al. (2022) found that firms adjust ESG behavior in governance after ratings changes (which provides some insight into actual changes that could affect value), but there was no effect of rating changes on firm capital expenditures. Serafeim and Yoon (2022) found that ESG ratings predict future ESG news and the associated market reactions.

A number of studies found that institutional investors favor highly rated ESG firms. Nofsinger et al. (2019) found that institutional investors, especially long-term institutional investors, underweight firms with negative indicators for environmental and social risks; the same investors seem to be indifferent to positive environmental and social indicators. Starks et al. (2017) also found that long-term institutional investors tilt investments to firms with better ESG characteristics. Kruger et al. (2020) found that large, long-term institutional investors believe that environmental risks impact stock returns. Note that institutional ownership itself can be associated with stronger financial performance (Alkurdi et al., 2021), and that could complicate the causation dilemma explored in this article—do higher ESG ratings merely appeal to more investors, or do higher ratings really mean more intrinsic value?

Several studies have found that the individual E, S, and G factors represent different channels by which performance affects returns. Pastor et al. (2022) found that returns in green bonds and green funds were driven by increases in investor environmental concerns rather than expectations of future returns. Gregory (2022) looked specifically at company performance during the COVID-19 pandemic and found that non-financial S&P 1500 firms with higher environmental and governance scores performed better financially during the pandemic. Engelhardt et al. (2021) studied European firms and found ESG ratings to be positively associated with abnormal returns during the COVID-19 pandemic. Specifically, Engelhardt et al. (2021) found that the social rating score was the primary driver of the positive correlation.

Positive correlations between ESG performance and financial performance may likely be due in part to transparency and/or public perception. Chen and Xie (2022) found that company ESG disclosures favorably affect financial performance for firms with ESG investors, high media attention, and high agency costs. The key conclusion was that ESG disclosures attract ESG-minded investors and that that positively affects financial performance. Serafeim (2020) found that public sentiment about a firm's sustainability performance has influenced firm value and the stock returns of investing based on ESG metrics. Minutolo et al. (2019) noted that other literature suggests that ESG might be related to a company's sustainability, but Minutolo et al. (2019) asserted that an ESG score is a strategic choice about transparency that results in better financial performance. Minutolo et al. (2019) found higher Tobin's Q and higher ROA associated with ESG transparency. A company's strategic choice to be transparent could explain the results of better financial performance.

2.2. Ambiguity remains

The above section demonstrates the research consensus of a positive correlation between ESG performance and financial performance, which becomes an important premise in this article. However, there is abundant ambiguity in the literature. That ambiguity illustrates the key contribution of this article: Research scholars do not fully understand why ESG performance is positively related to

financial performance, and that drives divergent study results. The studies reviewed below show that different time periods, different samples, and different methodologies produce different results. Some of the different methodologies are due to different causation assumptions, but others are due to the nature of ESG research. Notable challenges in the nature of ESG research discussed here include the subjective processes of ESG ratings and the materiality of ESG ratings.

Two notable meta-studies fail to find a conclusive overall positive correlation between ESG performance and financial performance: Atz et al. (2022) and Hvidkjaer (2017). Atz et al. (2022) evolved from the content and data in Whelan et al. (2021), but Atz et al. (2022) reached different conclusions. Atz et al. (2022) concluded that the difference between ESG investing and conventional investing has been indistinguishable. Atz et al. (2022) challenged the conclusions of other recent industry reports, and the study credits the surprising conclusion to a carefully constructed methodology and an attempt to distinguish self-declared ESG funds from actual ESG funds; Atz et al. (2022) also attempted to avoid evaluating different ESG investment strategies in the same manner. Hvidkjaer (2017) also reviewed multiple empirical studies and provided an overview of ESG findings before 2017. Hvidkjaer (2017) found evidence that ESG investing increases value for shareholders, but the findings were nuanced by the time period and agency issues. Hvidkjaer (2017) found that high ESG ratings were associated with high future stock returns from 1991 to 2004 but not from 2005 to 2012. The association after 2012 is questionable. In dissecting the questionable association, Hvidkjaer (2017) discussed whether or not ESG initiatives benefit company managers or company shareholders and found a negative correlation between ESG initiatives and stock returns, which suggests a benefit to the former and not the latter. However, Hvidkjaer (2017) found that good corporate governance can mitigate these agency issues, and that active ESG investors (investors that encourage management of ESG issues through engagement with management or exercising shareholder rights) add value for both managers and shareholders.

Galema and Gerritsen (2022), discussed above, found (and found literature support for) a positive correlation between ESG and financial performance; however, the study noted some contradictory literature. Gillan et al. (2010) found that institutional investors favor poor ESG performers, and Di Giuli and Kostovetsky (2014) found a negative correlation between ESG improvements and operating performance (as cited by Galema and Gerritsen, 2022). Galema and Gerritsen (2022) found that sustainable indices are infrequently updated (notwithstanding of the study's findings that exclusion from such indices will ultimately reduce abnormal returns). Similarly, even though Galema and Gerritsen (2022) found that fund managers prefer higher ESG ratings, a study mentioned by Galema and Gerritsen (2022) (Gantchev and Giannetti, 2023) found that highly rated ESG investments underperformed (even if there was a positive effect from initial investor enthusiasm). Ultimately, Gantchev and Giannetti (2023) suggested that the tradeoff between sustainability and performance canceled the effect of each other, and sustainability ratings should have no effect on investor trades.

Materiality is an important issue that seems to explain some of the ambiguity in the ESG space; the consensus is that materiality matters, but the debate on how to properly account for materiality is far from settled. Berchicci and King (2022) directly disputed the findings in Khan et al. (2016) (discussed above) and claimed that that study was flawed because of improper materiality data. Berchicci and King (2022) found minimal evidence that investing in top ESG firms (even with relevant materiality) will yield positive investment returns. Madison and Schiehll (2021) noted the importance of materiality and showed that ESG performance scores and ESG rankings notably changed after

materiality based on Morgan Stanley Capital International (MSCI) ESG ratings and/or the Sustainability Accounting Standard Board's (SASB) financial Materiality Map was considered. Madison and Schiehll (2021) noted the importance of rigorous materiality methodology; the study found that natural resource use in the environmental pillar accounted for the largest change in ESG scores and rankings after considering materiality. Wu et al. (2018) found that different approaches to materiality yielded different results after testing four materiality screening methods. Wu et al. (2018) recommended the GRI's Sustainability Disclosure Database because of its balanced disclosures. Esterer and Leuchtner (2022) took a slightly different look at materiality and assessed which financial performance measures were driven by sustainability performance. The study found that sustainability performance was material to risk and return but not to company growth.

Several studies questioned the quality of ESG ratings, different rating agencies, and the company disclosures that were analyzed to assign those ratings. As much of the literature does, Whelan et al. (2021) pointed out that ESG ratings are not standardized and that researchers use different, unstandardized ESG ratings from different agencies (that construct ratings using different processes). Thus, it is unsurprising that those studies would reach different conclusions. King and Pucker (2022) also noted that ESG ratings are based on subjective and sometime unreliable data. Berg et al. (2021) questioned the reliability of ESG ratings of Refinitiv, and Berg et al. (2021) conducted a study that showed that Refinitiv's initial ESG ratings were not associated with stock performance, but Refinitiv rewrote past ratings, and the rewritten ratings were positively correlated with stock performance. Alves et al. (2022) conducted a huge study with more than 9000 firms in 46 countries over a time period of 20 years; the study used ESG ratings from three providers (MSCI, Refinitiv, Sustainalytics) and controls for multiple variables. Alves et al. (2022) found minimal evidence that ESG ratings were related to investment returns. Ademi and Klungseth (2022) found that the literature contained contradictory evidence regarding the effect of ESG ratings on a firm's financial performance. Wilhelmsen and Woods (2021) studied large capitalization European public companies from 2014 to 2019 and found a negative correlation between ESG ratings and abnormal returns, and the researchers inferred that firms with low ESG ratings were riskier investments and thus yielded higher returns as is consistent with risk-return financial theory. Wilhelmsen and Woods (2021) used ratings from Thomson Reuters, Bloomberg, and Sustainalytics. With all three rating methods, Wilhelmsen and Woods (2021) observed a negative relationship between ratings and abnormal returns. However, the three rating methods resulted in different portfolios and returns, which led Wilhelmsen and Woods (2021) to add that ESG ratings were highly subjective. Bae et al. (2021) studied the relationship between corporate social responsibility (CSR) and company stock returns during the COVID-19-induced market downturn and subsequent recovery. Bae et al. (2021) found no relationship between CSR and stock returns, and the authors suggested that CSR ratings were not necessarily related to corporate actions that would protect shareholder value during challenging market environments. Finally, as a study by Giannopoulos et al. (2022) found conflicting results in the Norwegian market—ESG scores/initiatives were positively related to ROA but negatively related to Tobin's Q. Giannopoulos et al. (2022) blamed the quality of ESG scores for the mixed results—"Our findings suggest that more needs to be done to provide more precise guidelines for ESG disclosure to help stakeholders make a better decision" (page 13). Giannopoulos et al. (2022) described two problems with ESG scores, which the authors note as limitations in their study. Giannopoulos et al. (2022) noted that ESG initiatives may not be reflected in

ESG scores; thus, the authors call for better ESG disclosure regulations. Also, as a limitation to their work, Giannopoulos et al. (2022) suggested that there could be an “omitted variable problem” that affects ESG and/or financial performance. Giannopoulos et al. (2022) noted that the field of ESG is constantly changing; thus, both of these limitations could be eliminated in the coming years.

Gibson et al. (2021) studied the level of ratings disagreement among seven different ESG ratings providers. Gibson et al. (2021) found that ESG rating disagreement was positively associated with stock returns, which indicates that stocks with ratings disagreements are riskier and yield a risk premium. Christiansen et al. (2022) found that the problem of ESG rating disagreement was actually increased by firms’ ESG disclosures. In other words, the more information that a firm provides, the larger the ESG ratings disagreement. This shows confusion that is not resolved by more information, which is an especially strong strike against the reliability of ESG scores. Berg et al. (2022) studied divergence of ratings among six notable ESG rating agencies and found divergence in ratings based on three factors: ratings based on different methods of measuring the same attribute, ratings based on different attributes, and ratings based on different weighting of attributes. Additionally, Berg et al. (2022) found a “rater effect”, where the rater’s view of the overall firm influenced different rating categories. The study concludes that greater attention to rating processes in ESG is necessary.

The previous studies are examples of recent studies that question the quality of ESG ratings directly. However, it should be noted that the studies that found a positive correlation between ESG performance and financial performance generally support the value of ESG ratings either directly or indirectly because ESG ratings have become the typical way to express ESG performance. Additionally, there are two recent studies that specifically note value in ESG ratings: Meyer et al. (2020) and Bermejo Climent et al. (2021). Meyer et al. (2020) assessed whether or not ESG scores have information value (the study did not examine the effect of higher or lower scores) and found that they do contain information value. Meyer et al. (2020) found that the release of Sustainalytics ESG scores increases liquidity and abnormal returns for scored companies. Meyer et al. (2020) concluded that ESG scores decrease information asymmetry, which has a two-fold effect. First, liquidity increases because traders trade more confidently at prices closer to perceived equilibrium prices. Second, abnormal returns increase because the decrease in the dispersion of investor beliefs decreases risk. Bermejo Climent et al. (2021) directly studied the effect of ESG disclosures by firms and found that disclosing ESG information was positively associated with return growth.

Besides the challenges associated with ratings, there are other methodological pitfalls in the ESG research space. Whelan et al. (2021) (discussed above) explored many challenging aspects of ESG research that color the implications of the research conclusions (despite the fact that Whelan et al. (2021) affirmed a positive relationship between ESG performance and financial performance). Whelan et al. (2021) found the following common problems in ESG research: inconsistent terminology, lack of standardization of ESG data, varied approaches of ESG investing, and failure to distinguish materiality. In addition to discussing these challenges to ESG research, Whelan et al. (2021) noted six key takeaways from the meta-analysis, and these six challenges illustrate that different methodologies and different causation assumptions lead to different results. The six key takeaways are: improved financial performance over longer time periods; ESG integration and ESG momentum strategies outperform negative screening and ESG leaders, respectively; ESG investing provides downside protection; financial performance of strong ESG firms is associated with improved risk management

and innovation; firms that are prepared for a future of low carbon perform well financially; and ESG disclosures alone are not associated with financial performance.

Whelan et al. (2021) concluded with two important points: (1) the reviewed literature points to a consensus that good ESG management results in good stock returns; it is telling that Whelan et al. (2021) used the term “ESG management” instead of a more specific term like “ESG ratings”; and (2) the literature does not provide insight as to why this correlation exists. It seems that the second point will continue to confound results and conclusions in the ESG literature until (and if) it is resolved.

King and Pucker (2022) was somewhat of a meta-study that took a negative view on ESG investing. As such, the study serves as a good summation of the challenges in ESG research. King and Pucker (2022) conducted interviews with financial industry practitioners and cited several studies to provide a perspective on ESG investing. The study suggested that ESG investing has been popularized primarily by marketing and does not benefit the environment nor yield higher investment returns. King and Pucker (2022) even suggested that ESG investing was an obstacle to needed environmental regulation. King and Pucker (2022) also discussed characteristics of ESG investing that made research consensus difficult: First, ESG is not clearly defined, and ratings are based on subjective and often unreliable data (as mentioned earlier). Second, ESG research is often flawed and based on statistically insignificant time periods. Third, studies that find a correlation between strong ESG performance and strong stock returns almost universally fail to properly address the question of causation; King and Pucker (2022) suggested that both variables may well be a function of quality management, which is generally not measured in ESG empirical studies.

The authors of this article conclude that the literature reviewed points to a positive correlation between ESG performance and financial performance; however, the ambiguity mentioned above is driven by the key conclusion in this article: There is a gap in understanding causation, which has understandably led to divergent study results. If the cause of better financial performance is not clear, then the proper choice of methodology will also be ambiguous.

3. Methodology

This paper examines the relationship between Bloomberg ESG ratings (and changes) and stock performance, and between Bloomberg ESG disclosure scores (and changes) and stock performance for S&P 500 companies from 2020 to 2022. The time period is the most recent two years as of the initial analysis for this article. The time period does not start earlier than that because of the rapidly evolving ESG landscape; the explosive growth and popularity of ESG investing and the constantly developing ESG ratings are likely to create an unstable methodology over longer time periods. However, this short study period is likely to suffer from time-period bias; in particular, the effects of the COVID-19 pandemic should be recognized. Prior ESG studies during the COVID-19 pandemic produced mixed results. Albuquerque et al. (2020) showed that both investor and customer loyalty aided stock performance of ES-oriented firms. Engelhardt et al. (2021) also found positive associations of ESG performance and financial performance during the pandemic and noted the social score as the primary driver. Comparatively, Gregory (2022) found that environmental and governance scores were more relevant during the pandemic. However, Bae et al. (2021) found that CSR ratings did not enhance stock performance and suggested that CSR ratings were not related to real value enhancements.

Bloomberg is a premier global provider of financial information (Wood et al., 2016) widely used by financial professionals (Moreale and Zaynudinova, 2018). Bloomberg issues ESG ratings based on company-reported data after standardizing it and ensuring that it applies to at least 80% of company operations and workforce, so that the score will be representative of the operational impact of the company (Bloomberg Professional Services, n.d.²). ESG scores are assigned on a scale of 0 to 10 and evaluate a company's effectiveness managing financially material environmental, social, and governance risks. The weight of variables considered is determined based on the sector and peer group (e.g., sector: oil and gas, peer group: exploration and production). Bloomberg defines financial materiality as "the issues that can have a negative or positive impact on a company's financial performance, such as revenue streams, operating costs, cost of capital, asset value and liabilities" (Bloomberg, 2023³). Bloomberg further considers the timing, probability, and magnitude of each issue included in the score. Scores are updated as new data is released (Bloomberg, 2023⁴). Disclosure scores focus on transparency, independent of a firm's performance on any given ESG metric. Disclosure scores range from 0 (no data disclosed) to 100 (all data disclosed). The S&P 500 index consists of 500 large-cap U.S. companies that act as a barometer for all global securities (Kwadjo Gyeke and Kwame, 2024).

Abnormal returns were calculated for each security over the time period of May 18, 2020 to May 18, 2022 and compared to ESG metrics. The Capital Asset Pricing Model (CAPM) was used to calculate abnormal (or excess) returns above the expected returns based on the risk-free rate, the expected market return (as represented in this article by the S&P 500), and the company sensitivity to the overall market (as represented by the company beta) (Lyu, 2024). The formula is as follows:

$$\text{Abnormal Return} = \text{Actual Return} - [R_f + \beta_i(R_m - R_f)] \quad (1)$$

where:

R_f = Risk Free Rate

β_i = Company Beta

R_m = Expect Return of the Market

The risk-free rates as of May 18, 2020 and May 18, 2021 were used for the first and second year, respectively. All data, including ESG ratings, ESG disclosure scores, security returns, company betas, risk-free rates, and overall S&P 500 returns were sourced from Bloomberg. This paper compares abnormal returns over the previous two-year period (2020–2022) with the current (2022) individual and total ESG ratings and ESG disclosure scores. Total ESG ratings and total ESG disclosure scores are simply the sum of each of the three individual ratings or scores. Regression analysis was used to calculate Pearson correlation coefficients. Regression coefficients with p-values of less than 5% will be considered statistically significant. This paper also compares abnormal returns over the previous two-year period with the change in individual and total ESG ratings and individual and total ESG disclosure scores.

² ESG Data. Bloomberg Professional Services, n.d. Available from <https://www.bloomberg.com/professional/dataset/global-environmental-social-governance-data/>.

³ Bloomberg ESG Scores: Overview and FAQ. Bloomberg L.P., 2023. Available from <https://hr.bloombergadria.com/data/files/Pitanja%20i%20odgovori%20o%20Bloomberg%20ESG%20Scoreu.pdf>.

⁴ Bloomberg ESG Scores. Bloomberg L.P., 2023.

Hypothesis 1:

H_0 1: *Correlation (R) between Abnormal Returns and Current ESG Rating = 0*

H_a 1: *Correlation (R) between Abnormal Returns and Current ESG Rating ≠ 0*

As discussed in the literature review, a preponderance of studies found a positive relationship between ESG performance and financial performance (Khan et al., 2016; Khan, 2019; Whelan et al., 2021; Galema and Gerritsen, 2022; Capelle-Blancard and Petit, 2019; Aureli et al., 2020; Guest and Nerino, 2020; Shanaev and Ghimire, 2021; Berg et al., 2022; Pastor et al., 2022; Gregory, 2022; Engelhardt et al., 2021; Minutolo et al., 2019). Very few articles noted a clear negative correlation, but several articles noted nuances and mixed results; notably, Atz et al. (2022) casts doubt on the positive relationship by examining over a thousand studies and finding the ESG effect to be indistinguishable. Hvidkjaer (2017) studied financial returns over a 20-year period and found mixed results. Thus, Hypothesis 1 has become a central question in ESG investing.

Hypothesis 2:

H_0 2: *Correlation (R) between Abnormal Returns and Changes in ESG Rating = 0*

H_a 2: *Correlation (R) between Abnormal Returns and Changes in ESG Rating ≠ 0*

Some of the literature specifically studied changes and/or investments in ESG and found that positive changes or increased investments were positively related to financial performance (Galema and Gerritsen, 2022; Guest and Nerino, 2020; Shanaev and Ghimire, 2021; Berg et al., 2022). Other literature suggests that changes or investments were negatively correlated with financial performance (Di Giuli and Kostovetsky, 2014 [as cited by Galema and Gerritsen, 2022]; Gantchev et al., 2023). Giannopoulos et al. (2022), mentioned above, arguably found both results; the authors frame ESG ratings as ESG investments for companies, and Giannopoulos et al. (2022) found that ESG scores/initiatives were positively related to ROA (which is perhaps a short-term measure) but negatively related to Tobin's Q (which is perhaps a long-term measure). Hypothesis 2 is thus an important analysis of the effect (and its duration) of actions that improve ESG scores.

Hypothesis 3:

H_0 3: *Abnormal Returns of Firms with ESG Ratings*

= *Abnormal Returns of Firms Without Complete ESG Ratings*

H_a 3: *Abnormal Returns of Firms with ESG Ratings*

≠ *Abnormal Returns of Firms Without Complete ESG Ratings*

The explosive popularity of ESG investing discussed in the introduction illustrates the impact of ESG themes in both asset management and company operations. Yet, the mixed literature and the criticisms of ESG ratings beg the question of credibility in ESG metrics. It is thus prudent to assess the impact of merely having ESG ratings in order to examine other variables that might drive financial returns. This particular test is not common in the ESG literature and may represent important insights.

Hypothesis 4:

H_0 4: *Correlation (R) between Abnormal Returns and Total ESG Disclosure Score = 0*

H_a 4: *Correlation (R) between Abnormal Returns and Total ESG Disclosure Score ≠ 0*

A number of studies noted ESG transparency as a factor in financial performance. Minutolo et al. (2019) went so far as to call transparency a strategic company choice that increases value, and Shohaieb et al. (2022) suggested that higher disclosure is itself a driving force in improving the very metrics that are to be disclosed. Giannopoulos et al. (2022) called for more guidance for disclosures as a method for

solving the ambiguous relationship between ESG ratings and financial performance. In addition to Minutolo et al. (2019), Chen and Xie (2022) was notable in the literature review because it empirically found that disclosures positively affect financial performance, but only for companies with specific characteristics. Hypothesis 4 adds to the empirical analysis and seeks to understand the ambiguity of the relationship between ESG performance and financial performance.

Hypothesis 5:

H_0 5: *Correlation (R) between Abnormal Returns and Changes in ESG Disclosure Score = 0*
 H_a 5: *Correlation (R) between Abnormal Returns and Changes in ESG Disclosure Score ≠ 0*

There seems to be minimal study on the effect of changes in disclosure scores; however, as noted with Hypothesis 2, there have been several studies that assessed the costs and benefits of investments in ESG initiatives. Hypothesis 5 could be exploratory research, but it is an important channel of research because of the role that ESG transparency might play in financial performance. The results of Hypothesis 5 could be helpful in clarifying the causation dilemma.

4. Results

Table 1 shows descriptive statistics for the study data. There were 501 S&P 500 firms studied in this research. Bloomberg issued current environmental, social, and governance ratings for 281, 281, and 484 of the companies, respectively. Of those companies, 269 have current ratings for all three areas. A total ESG score was calculated for all 501 companies; however, the total ESG score was not meaningful and not analyzed for securities without all three ESG ratings. ESG disclosure scores were available for 377 firms. Governance disclosures are the most comprehensive, ranging from 68.18 to 100; the disclosure of environmental and social data is less consistent and transparent. Data for betas, returns, and abnormal returns is provided for all 501 companies.

Table 1. Descriptive statistics for ESG ratings, disclosures, and returns of S&P companies in 2022.

	N	Minimum	Maximum	Mean	Std. Deviation
S&P 500 Firms	501				
Environmental Rating	281	0	7.91	3.6931	1.7426
Social Rating	281	0.69	9.57	3.7497	2.01216
Governance Rating	484	4.08	8.69	6.6859	0.84781
Total Current ESG Rating	501	0	22.26	10.634	4.60074
Firms with Complete Current Ratings	269				
Environmental Disclosure Score	377	0	84.42	38.982	19.65063
Social Disclosure Score	377	9.16	78.93	33.935	12.69167
Governance Disclosure Score	377	68.18	100	91.033	5.4088
Total ESG Disclosure Scores	377	85.71	85.71	54.697	11.0395
Company Betas	501	0.37	1.84	1.0014	0.2519
Return 2020–2022	501	−0.61	4.61	0.4909	0.59011
Abnormal Return 2020–2022	501	−1.03	4.27	0.1638	0.57155

Table 2 shows the correlation between each company's abnormal return over the prior two years with each variety of ESG rating using the 269 companies with complete current Bloomberg ratings. The results show that there is no correlation between the current total ESG score and the abnormal return (with a high p-value of 22.9%) over the previous two years. In other words, the results show that companies with higher total ESG scores do not have statistically significant higher returns. Table 2 shows that there is a statistically significant, positive relationship between abnormal returns and the Bloomberg social rating. The correlation coefficient is 0.134, and the p-value is 2.8%. Thus, higher social ratings are associated with higher abnormal returns for these 269 companies over the previous two years. It seems that null Hypothesis 1 is rejected only for social ratings. These results are different than the consensus of the literature that points to a statistically significant, positive correlation, but these results add to the abundant literature that show mixed results.

Table 2. Abnormal return correlations with current ESG ratings for firms with complete data.

	Pearson Correlation	P-Value	N
Environmental Rating & Abnormal Return	-0.051	0.401	269
Social Rating & Abnormal Return	0.134*	0.028	269
Governance Rating & Abnormal Return	0.072	0.239	269
Total Current ESG Rating & Abnormal Return	0.074	0.229	269

*Statistical significance 5%; **Statistical significance 1%

The results in Table 2 are based only on companies that received all three ESG ratings from Bloomberg. Comparing abnormal returns with the total ESG rating would not be meaningful with partial data; companies with missing data would arbitrarily have lower ratings. However, it might be useful to compare abnormal returns with individual environmental, social, and governance ratings; the researchers of this paper tested those correlations and found that those results were not meaningfully different from the results in Table 2.

Table 3 compares the abnormal return for the 259 S&P 500 companies with the change in ESG ratings over the previous two years. Table 3 illustrates an important takeaway from this research: Increases in ESG ratings over the two-year period are associated with lower abnormal returns. For the 259 companies with both current ESG ratings and ESG ratings from two years prior, the correlation between abnormal returns and the total ESG change is -0.136 with a statistically significant p-value of 2.8%. Null Hypothesis 2 is rejected for total current ESG rating changes. Like Di Giuli and Kostovetsky (2014) [as cited by Galema and Gerritsen, 2022], Gantchev and Giannetti (2023), and (partially) Giannopoulos et al. (2022), these results suggest that investments in ESG decrease firm value.

Table 3. Abnormal return correlations with ESG rating changes from 2020 to 2022.

	Pearson Correlation	P-Value	N
Environmental Rating Change & Abnormal Return	-0.112	0.072	259
Social Rating Change & Abnormal Return	-0.094	0.133	259
Governance Rating Change & Abnormal Return	-0.067	0.285	259
Total Current ESG Rating Change & Abnormal Return	-0.136*	0.028	259

*Statistical significance 5%; **Statistical significance 1%

Table 4 compares average abnormal returns for the 269 S&P 500 companies with complete current Bloomberg ESG scores with average abnormal returns for the 232 S&P 500 companies without complete current data. Table 4 shows a key result in this study: The average abnormal return is significantly higher for companies with complete ESG ratings from Bloomberg. For the 269 firms with all three ESG ratings, the average abnormal return over the two-year study period is 21.29%. The average abnormal return for the 232 firms without all three ratings is 10.69%. The difference is statistically significant with a p-value of 3.5%. As shown in Table 4, the 95% confidence interval for the mean difference contains positive upper and lower bounds, and the interval does not cross zero. Companies that had complete ESG ratings from Bloomberg had abnormal returns that were 10.6% higher over the two-year study period, and that difference is statistically significant.

Table 4. Average abnormal returns for S&P 500 companies with complete ESG ratings and companies without complete ESG ratings.

	Sample Size	Mean	Std. Deviation	Std. Error	Mean Difference	95% Confidence Interval Difference	P-Value Difference
Companies with Ratings	269	0.2129	0.62738	0.03825		<i>Lower</i>	<i>Upper</i>
Companies without Ratings	232	0.1069	0.49433	0.03245	0.1060	0.0075	0.2046 0.035*

*Statistical significance 5%; **Statistical significance 1%

Null Hypothesis 3 is rejected; there is a statistical difference between firms with and without complete ESG ratings. This finding does not necessarily support the literature that found positive correlations between ESG performance and financial performance; instead, it seems to support the literature that casts doubt on that relationship—in particular the findings of Giannopoulos et al. (2022) that suggested an “omitted variable problem.” Perhaps merely having ESG scores is such an omitted variable. The explosive popularity of ESG investing could be more related to the appearances created by having ESG scores than previously thought.

Table 5 compares abnormal returns with current ESG disclosure scores for the 377 S&P 500 companies with Bloomberg disclosure scores. The results indicate that all current disclosure scores are significant at the 1% level, suggesting that a high level of disclosure of ESG data is related to higher abnormal returns. Null Hypothesis 4 is soundly rejected for all variables. The empirical analyses of Minutolo et al. (2019) and Chen and Xie (2022) are supported with these results. As Giannopoulos et al. (2022) suggested, ESG disclosure itself might be a driving force that improves financial performance, but that question must be considered in conjunction with the other results.

Table 5. Abnormal return correlations with ESG disclosure score.

	Correlation	P-Value	N
Environmental Disclosure Score & Abnormal Return	0.142**	0.006	377
Social Disclosure Score & Abnormal Return	0.176**	< 0.001	377
Governance Disclosure Score & Abnormal Return	0.147**	0.004	377
Total ESG Disclosure Score & Abnormal Return	0.176**	< 0.001	377

*Statistical significance 5%; **Statistical significance 1%

Table 6 shows abnormal returns correlated with changes in ESG disclosure scores between 2020 and 2022. Changes in governance disclosure scores is the only variable with a statistically significant correlation, with a correlation coefficient of 0.106 and a p-value of 3.9%. The results suggest that increased transparency in environmental and social scores is not significant, but increased transparency in governance is related to higher returns. Hypothesis 5 is rejected for governance scores but not for the other scores. As discussed in the Methodology section, there has been limited research in this area, and these results do not seem to herald a new channel of research.

Table 6. Abnormal return correlations with ESG disclosure score change—2020 to 2022.

	Correlation	P-Value	N
Environmental Disclosure Score Change & Abnormal Return	0.047	0.362	377
Social Disclosure Score Change & Abnormal Return	0.063	0.221	377
Governance Disclosure Score Change & Abnormal Return	0.106*	0.039	377
Total ESG Disclosure Score Change & Abnormal Return	0.094	0.067	377

*Statistical significance 5%; **Statistical significance 1%

Table 7 shows that ESG disclosure scores are correlated with total ESG ratings, and all correlations are statistically significant at the 1% level. It seems that there is a strong link between a company's ESG disclosure (or transparency) and its ESG rating. Note that Table 7 compares different disclosure scores (E, S, G, and total) with the total ESG rating. The researchers of this paper tested correlations between different disclosure scores (E, S, G) versus different ratings (E, S, G) and found that those results were not meaningfully different from the results in Table 7. If there are questions about whether ESG disclosure or ESG performance is driving financial performance, it is useful to now understand from these results that those two factors are strongly correlated with each other. Minutolo et al. (2019) suggested that disclosure as a strategic choice drives financial performance, but researchers should also consider how the correlation between these two variables affects the conclusions.

Table 7. Total ESG rating correlations with ESG disclosure score.

	Correlation	P-Value	N
Environmental Disclosure Score vs. Total ESG Rating	0.484**	< 0.001	377
Social Disclosure Score vs. Total ESG Rating	0.449**	< 0.001	377
Governance Disclosure Score vs. Total ESG Rating	0.273**	< 0.001	377
Total ESG Disclosure Score vs. Total ESG Rating	0.502**	< 0.001	377

*Statistical significance 5%; **Statistical significance 1%

5. Conclusions

The main contribution of this article is to illuminate the causation gap in ESG research, and this contribution is seen in this study's literature review and results. The literature review shows that differing causation assumptions drive differing empirical conclusions. Like most ESG literature, the results of this study point to a positive link between ESG performance and financial performance, and, like the overall ESG literature, this study shows conflicting results. The findings in Table 4 indicate substantially better financial performance for firms with Bloomberg ESG ratings compared to firms without ratings. Firms must make an effort and be engaged in the ESG discussion in order to obtain a rating, and that effort could cause higher returns. Alternatively, investors in today's market demand sustainable investments, so the label of ratings could also cause higher returns. But Table 2 indicates that among rated firms, a firm's ESG rating is not correlated with abnormal returns (except the social rating). In isolation, Table 2 and Table 4 show that having a rating matters but the actual rating received does not matter, so firms can add value by engaging enough to receive a rating—perhaps because of the impact of this engagement or perhaps because of the signal to investors. Out of isolation (after considering the ESG literature), these results are two of many that suggest a positive correlation but fail to show the precise cause.

The disclosure analysis mirrors the ratings analysis by suggesting that ESG activity enhances financial performance but by failing to pinpoint the actual cause. Table 5 shows that disclosing ESG information (but not necessarily good information) is associated with market value. This finding suggests transparency (or the appearance of transparency) as a possible cause of financial performance. Table 7 shows a strong positive link between disclosure and ratings, which suggests that companies with good news are more likely to disclose it; thus, transparency itself could be a good indication of good ESG performance.

The results in Table 3 reinforce a central conclusion of this article: The details of the relationship between ESG performance and financial performance are unclear. Table 3 surprisingly shows a negative correlation between rating changes and abnormal performance over the previous two years. In other words, this study finds that companies that increased total ESG ratings over the study period experienced lower abnormal returns over the same period. Sustainability investments are costly, and that could hurt financial performance and stock returns. Although, it seems unlikely that investors would have frowned on these expenditures given the market's craving for ESG-savvy firms. Perhaps, as Hvidkjaer (2017) suggested, ESG projects are more likely to benefit managers than investors.

Ultimately, the authors of this study cannot claim to know the cause of this result and leave it for the developing mosaic of ESG research.

As a contribution to the ESG mosaic, this study suggests that engagement (to obtain ratings) and transparency (via ESG disclosures) are important factors of financial performance for ESG companies. This study also suggests that Bloomberg social scores may effectively quantify price-relevant ESG performance. As a larger contribution, this study suggests that the divergent results in this and other ESG studies are driven by different causation assumptions.

6. Limitations and future research opportunities

The two key limitations in this article are: failure to consider materiality and failure to consider the effect of quality management. The recent ESG literature identifies materiality as an important factor that could be perilous to ignore. The literature also notes quality management as a likely factor in both ESG and financial performance. The reason that this is a limitation in this study is because quality management could have explained the results of this research—it could have been the actual driver for the engagement, transparency, and stock performance observed in this study.

This paper fails to consider materiality in company ESG scores. This has been a tough issue for researchers in the ESG space, and Whelan et al. (2021) noted that this issue is commonly ignored. Khan et al. (2016) was the first study to include materiality, with an intensive process of assessing SASB guidance, filling in gaps, and assigning materiality scores. Khan et al. (2016) should be commended for this work, but this did add yet another level of subjectivity to ESG research. As noted, King and Pucker (2022) claimed that once the errors in Khan et al. (2016) were corrected, the correlation between strong financial performance and high (material) ESG scores disappeared. Nonetheless, analysis of materiality needs to continue in future research. Both investors and company managers realize that ESG risks vary by company, and researchers need to find the best way to quantify the materiality of risk. Progress in this area would enlighten academics, guide company managers, and inform investors who currently invest \$35.3 trillion in ESG assets (GSIA, 2020).

This paper also fails to consider the effect of quality managers at ESG firms, and this is a needed, although not promising, area of future research. King and Pucker (2022) bluntly asserted that quality management could be the real driving factor for *both* higher ESG ratings and good financial performance. One of the six key takeaways from the meta-analysis by Whelan et al. (2021) was that improved risk management and innovation was associated with strong financial performance of ESG firms. Thus, analyzing the link between ESG ratings and financial performance arguably ignores the actual underlying cause. It will undoubtedly be difficult to add qualitative measurements of good management to a field of financial research that has come to rely on the abundantly available quantitative data. But the strength of management has clearly emerged as an important factor in returns of ESG companies and needs to be assessed in future research.

Use of AI tools declaration

The authors declare they have not used Artificial Intelligence (AI) tools in the creation of this article.

Conflict of interest

The authors declare that there are no conflicts of interest in this paper.

References

Ademi B, Klungseth N (2022) Does it pay to deliver superior ESG performance? Evidence from US S&P 500 companies. *J Glob Responsib* 13: 421–449. <https://doi.org/10.1108/JGR-01-2022-0006>

Albuquerque R, Koskinen Y, Yang S, et al. (2020) Resiliency of environmental and social stocks: An analysis of the exogenous COVID-19 market crash. *Rev Corp Financ Stud* 9: 593–621. <https://doi.org/10.1093/rcfs/cfaa011>

Alkurdi A, Hamad A, Thneibat H, et al. (2021) Ownership structure's effect on financial performance: An empirical analysis of Jordanian listed firms. *Cogent Bus Manag* 8. <https://doi.org/10.1080/23311975.2021.1939930>

Alves R, Krueger P, van Dijk M (2022) Drawing Up the Bill: Does Sustainable Investing Affect Stock Returns Around the World? *Network for Studies on Pension, Aging and Retirement*. https://www.netspar.nl/assets/uploads/P20220628_Netspar-Design-Paper-209_WEB.pdf.

Atz U, Van Holt T, Liu Z, et al. (2022) Does Sustainability Generate Better Financial Performance? Review, Meta-analysis, and Propositions. *J Sustain Financ Inv* 13: 802–825. <https://doi.org/10.1080/20430795.2022.2106934>

Atz U, Van Holt T, Liu Z (2020) Do corporate sustainability and sustainable finance generate better financial performance? A review and meta-analysis. *SSRN Electron J*. <https://doi.org/10.2139/ssrn.3708495>

Aureli S, Gigli S, Medei R, et al. (2020) The value relevance of environmental, social, and governance disclosure: Evidence from Dow Jones Sustainability World Index listed companies. *Corp Soc Resp Envir Ma* 27: 43–52. <https://doi.org/10.1002/csr.1772>

Bae K, El Ghoul S, Gong Z, et al. (2021) Does CSR matter in times of crisis? Evidence from the COVID-19 pandemic. *J Corp Financ* 67: 101876. <https://doi.org/10.1016/j.jcorpfin.2020.101876>

Berg F, Fabisik K, Sautner Z (2021) Is History Repeating Itself? The (Un)Predictable Past of ESG Ratings. *Eur Corp Governanc Inst – Finance Working Paper* 708/2020.

Berg F, Heeb F, Kölbel J (2022) The economic impact of ESG rating changes. <https://doi.org/10.2139/ssrn.4088545>

Berg F, Kölbel J, Rigobon R (2022) Aggregate confusion: The divergence of ESG ratings. *Rev Financ* 26: 1315–1344. <https://doi.org/10.1093/rof/rfac033>

Berchicci L, King A (2022) Corporate Sustainability: A Model Uncertainty Analysis of Materiality.

Bermejo Climent R, Garrigues I, Paraskevopoulos I, et al. (2021) ESG Disclosure and Portfolio Performance. *Risks* 9: 172. <http://dx.doi.org/10.3390/risks9100172>

Capelle-Blancard G, Petit A (2019) Every little helps? ESG news and stock market reaction. *J Bus Ethics* 157: 543–565. <https://doi.org/10.1007/s10551-017-3667-3>

Chen Z, Xie G (2022) ESG disclosure and Financial Performance: Moderating role of ESG Investors. *Int Rev Financ Anal* 83: 102291. <https://doi.org/10.1016/j.irfa.2022.102291>

Christensen D, Serafeim G, Sikochi A (2022) Why is Corporate Virtue in the Eye of the Beholder? The Case of ESG Ratings. *Account Rev* 97: 147–175. <https://doi.org/10.2308/TAR-2019-0506>

Engelhardt N, Ekkenga J, Posch P (2021) ESG Ratings and Stock Performance during the COVID-19 Crisis. *Sustainability* 13: 7133. <https://doi.org/10.3390/su13137133>

Esterer F, Leuchtner D (2022) What Is Material? Determining Materiality of Sustainability Issues for Measures of Corporate Financial Performance. <https://doi.org/10.2139/ssrn.4026209>

Fama E, French K (2007) Disagreement, tastes, and asset prices. *J Financ Econ* 83: 667–689. <https://doi.org/10.1016/j.jfineco.2006.01.003>

Galema R, Gerritsen D (2022) ESG rating score revisions and stock returns. *SSRN Electron J*. <https://doi.org/10.2139/ssrn.4218969>

Gantchev N, Giannetti M, Li R (2023) Sustainability or Performance? Ratings and Fund Managers' Incentives. Swedish House of Finance Research Paper No. 21-4, European Corporate Governance Institute – Finance Working Paper No. 747/2021.

Giannopoulos G, Kihle Fagernes RV, Elmarzouky M, et al. (2022) The ESG Disclosure and the Financial Performance of Norwegian Listed Firms. *J Risk Financ Manage* 15: 237. <https://doi.org/10.3390/jrfm15060237>

Gibson R, Krueger P, Schmidt P (2021) ESG Rating Disagreement and Stock Returns (Swiss Finance Institute Research Paper No. 19–67, European Corporate Governance Institute – Finance Working Paper No. 651/2020.

Governance & Accountability Institute (2022) 2022 Sustainability Reporting In Focus: Examining 2021 Trends of Companies on the S&P 500 and Russell 1,000. Available from: <https://www.ga-institute.com/research/ga-research-directory/sustainability-reporting-trends/2022-sustainability-reporting-in-focus.html>.

GSIA (2020) Global Sustainable Investment Review. Available From: <http://www.gsi-alliance.org/wp-content/uploads/2021/08/GSIR-20201.pdf>.

Gregory R (2022) ESG scores and the response of the S&P 1500 to monetary and fiscal policy during the Covid-19 pandemic. *Int Rev Financ* 78: 446–456. <https://doi.org/10.1016/j.iref.2021.12.013>

Guest P, Nerino M (2020) Do corporate governance ratings change investor expectations? Evidence from announcements by institutional shareholder services. *Rev Financ* 24: 891–928. <https://doi.org/10.1093/rof/rfz021>

Hvidkjær S (2017) ESG Investing: A literature Review. *Report Prepared for Dansif*. <https://dansif.dk/wp-content/uploads/2019/01/Litterature-review-UK-Sep-2017.pdf>.

Khan M, Serafeim G, Yoon A (2016) Corporate Sustainability: First Evidence on Materiality. Harvard Business School Working Paper, No. 15-073.

Khan M (2019) Corporate Governance, ESG, and Stock Returns Around the World. *Financ Anal J* 75: 103–123. <https://doi.org/10.1080/0015198X.2019.1654299>

King A, Pucker K (2022) *ESG and alpha: Sales or substance?* Institutional Investor. Available from: <https://www.institutionalinvestor.com/article/b1wxqznltqnyzj/ESG-and-Alpha-Sales-or-Substance>

Kruger P, Sautner Z, Starks L (2020) The importance of climate risks for institutional investors. *Rev Financ Stud* 33: 1067–1111. <https://doi.org/10.1093/rfs/hhz137>

Kwadjo Gyeke M, Kwame G (2024) The Impact of Dividend Policy on the Stock Return Volatility (A Study Of Financial Firms Listed On The S&P 500). *Int J Dev Res* 14: 64954–64961. <https://doi.org/10.37118/ijdr.27847.02.2024>

Lyu D (2024) Analyzing the Risk-Return Trade-Off Relationship of Chinese New Energy Firms Using the Capital Asset Pricing Model. *Highlights Bus Econ Manage* 30. <https://drpress.org/ojs/index.php/HBEM/article/view/19941>

Madison N, Schiehll E (2021) The effect of financial materiality on ESG Performance Assessment. *Sustainability* 13: 3652. <https://doi.org/10.3390/su13073652>

Martini A (2021) Socially responsible investing: from the ethical origins to the sustainable development framework of the European Union. *Environ Dev Sustain* 23: 16874–16890. <https://doi.org/10.1007/s10668-021-01375-3>

Meyer J, Schüpbach L, Utz S (2020) Capital-market effects of ESG scores: Evidence from a Quasi-Natural Experiment. *SSRN Electron J*. <https://doi.org/10.2139/ssrn.3683100>

Minutolo M, Kristjanpoller W, Stakeley J (2019) Exploring environmental, social, and governance disclosure effects on the S&P 500 financial performance. *Bus Strat Environ* 28: 1083–1095. <https://doi.org/10.1002/bse.2303>

Moreale J, Zaynudinova G (2018) A Bloomberg Terminal Application in an Intermediate Finance Course. *J Financ Edu* 44: 262–283.

Nofsinger J, Sulaeman J, Varma A (2019) Institutional investors and corporate social responsibility. *J Corp Financ* 58: 700–725. <https://doi.org/10.1016/j.jcorpfin.2019.07.012>

Pastor L, Stambaugh R, Taylor L (2022) Dissecting green returns. *J Financ Econ* 146: 403–424. <https://doi.org/10.1016/j.jfineco.2022.07.007>

Pastor L, Stambaugh R, Taylor L (2021) Sustainable investing in equilibrium. *J Financ Econ* 142: 550–571. <https://doi.org/10.1016/j.jfineco.2020.12.011>

Serafeim G, Yoon A (2022) Stock price reactions to ESG news: The role of ESG ratings and disagreement. *Rev Account Stud*. <https://doi.org/10.1007/s11142-022-09675-3>

Serafeim G (2020) Public Sentiment and the Price of Corporate Sustainability. *Financ Anal J* 76: 26–46. <https://doi.org/10.1080/0015198X.2020.1723390>

Shanaev S, Ghimire B (2021) When ESG meets AAA: The effect of ESG rating changes on stock returns. *Financ Res Lett* 46: 102302. <https://doi.org/10.1016/j.frl.2021.102302>

Shohaib D, Elmarzouky M, Albitar K (2022) Corporate governance and diversity management: Evidence from a disclosure perspective. *Int J Account Inf Manage* 30: 502–525. <https://doi.org/10.1108/ijaim-03-2022-0058>

Starks L, Venkat P, Zhu Q (2017) Corporate ESG Profiles and Investor Horizons. <https://doi.org/10.2139/ssrn.3049943>

van Duuren E, Plantinga A, Scholtens B (2016) ESG Integration and the Investment Management Process: Fundamental Investing Reinvented. *J Bus Ethics* 138: 525–533. <https://doi.org/10.1007/s10551-015-2610-8>

Whelan T, Atz U, Van Holt T, et al. (2021) ESG and Financial Performance. Center for Sustainable Business, NYU Stern. Available from: <https://www.stern.nyu.edu/sites/default/files/assets/documents/ESG%20Paper%20Aug%202021.pdf>.

Wilhelmsen E, Woods E (2021) *ESG Ratings and StockPerformance* (thesis). Available from: <https://openaccess.nhh.no/nhh-xmlui/bitstream/handle/11250/2767529/masterthesis.pdf?sequence=1>

Wood C, King A, Catlow R, et al. (2016) Terminal value: Building the alternative Bloomberg. *Financ Soc* 2: 138–150. <https://doi.org/10.2218/finsoc.v2i2.1727>

Wu S, Shao C, Chen J (2018) Approaches on the screening methods for materiality in Sustainability Reporting. *Sustainability* 10: 3233. <https://doi.org/10.3390/su10093233>



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