North American Journal of Economics and Finance 75 (2025) 102287

Contents lists available at ScienceDirect

North American Journal of Economics and Finance

journal homepage: www.elsevier.com/locate/najef

ESG investment performance and global attention to sustainability

Thanh Nam Vu [a,*], Heikki Lehkonen [a], Juha-Pekka Junttila [b], Brian Lucey [c,d,e,f]

[a] School of Business and Economics, University of Jyväskylä, Finland
[b] Oulu Business School, University of Oulu, Finland
[c] Trinity Business School, Trinity College Dublin, Ireland
[d] University of Economics Ho Chi Minh City, Viet Nam
[e] Jiangxi University of Finance and Economics, China
[f] Abu Dhabi University, United Arab Emirates

ARTICLE INFO

JEL Codes:
G11
G12
G15

Keywords:
ESG
Sustainable investing
Investment performance
Market attention

ABSTRACT

We analyze ESG-based investments in stocks across 23 developed markets using daily data from 2004 to 2022. The findings suggest a weak relationship between the ESG ratings and expected returns, with some evidence of modest underperformance of high ESG stocks compared to lower-rated ones in specific periods. This outcome indicates that stock prices have already reflected ESG information, and well-known asset pricing factors can effectively capture the returns of portfolios based on ESG ratings. However, the strength of this relationship depends on global attention to sustainability, where high ESG-rated stocks tend to gain advantages during unexpected attention increases, highlighting the dynamic, nonlinear nature of this relationship.

1. Introduction

Integrating environmental, social, and governance (ESG) metrics into investment analysis has gained attraction among investors and professional asset management institutions for extended periods. In the ESG global survey 2023 of BNP Paribas,[1] around one-fifth of institutional investors have incorporated the ESG information into the allocation process for half of equity investments, reflecting a growing interest in ESG investing. Given the increasing concern for the sustainability of both investors and authorities, investment strategies based on ESG performance have become a major topic among academic researchers. Numerous studies provide varying evidence to support either the outperformance or underperformance of high ESG-rated assets over low ESG-rated counterparts with

* Corresponding author at: School of Business and Economics, University of Jyväskylä, P.O. Box 35, FI-40014 Jyväskylä, Finland.
E-mail addresses: vuthanam@jyu.fi (T.N. Vu), heikki.lehkonen@jyu.fi (H. Lehkonen), juha.junttila@oulu.fi (J.-P. Junttila), brian.lucey@tcd.ie (B. Lucey).

[1] BNP Paribas (2023). ESG global survey 2023. https://securities.cib.bnpparibas/global-esg-survey-2023/global-esg-survey-2023-report (accessed 05 February 2024).

https://doi.org/10.1016/j.najef.2024.102287

Available online 12 September 2024

persuasive explanations. Generally, the outperformance is attributed to better fundamentals of firms with good ESG performance (Edmans, 2011; Lins et al., 2017; Wong and Zhang, 2022). On the other hand, the underperformance is due to higher expected returns of low ESG assets compensating for ESG risk[2] exposures (Bolton and Kacperczyk, 2021; Hong and Kacperczyk, 2009). Despite lower expected returns, investors could still prefer to hold sustainable assets because they get the non-pecuniary benefit of owning them. Some recent studies add the general economic conditions (Bansal et al., 2022) and level of social concern on sustainability (Ardia et al., 2022; Pástor et al., 2022) to the factors utilized to explain the time-varying performance of ESG investments. Pástor et al. (2022) argue that the abnormal returns of ESG-based portfolios could reflect the sustainability-concern shocks rather than ESG premiums. Pedersen et al. (2021) also describe this discrepancy by the differences in the ESG awareness and tastes of investors in the markets across time. Suppose ESG information is associated with the future fundamentals of firms. In that case, ESG investment delivers abnormal returns only when investors are ESG-unaware since the stock prices have not reflected that information yet. Following the argument of Edmans (2023), with the increasing concerns about sustainability in society, it is not expected that investors should find either outperformance or underperformance of ESG investments as the effects of ESG information are reflected in the prices of stocks in efficient markets.

In this study, we aim to extend the existing literature by reviewing once again the current empirical evidence for ESG investment at the global level. We validate and expect to form a solid conclusion about the relationship between ESG performance and expected returns in the recent decade, consolidating the newly developed theories on sustainable investment. In line with the argument of Edmans (2023) and Pedersen et al. (2021), we do not expect to find the outperformance of ESG investment with the assumption that investors have been ESG-aware. We hypothesize that sustainable investment strategies might no longer provide superior expected returns and even perform poorly due to investors' motivation shifting towards sustainability and responsibility in the most recent decade. However, sustainable stocks can have lower expected returns than non-sustainable ones when investors' tastes shift, leading to a higher demand for stocks with high ESG performance. Therefore, the study additionally examines the evolution of ESG investing performance in connection to the changes in the global attention to sustainability. We analyze a daily stock market dataset from the LSEG ESG database, covering firms from 23 developed markets for the period from 2004 to 2022 to study thoroughly the conditional performance of general ESG investments, expanding on especially the previous findings on green vs. brown assets[3] (Ardia et al., 2022; Pástor et al., 2022). We add to the ambivalent literature on ESG investing by examining whether the general ESG rating still provides financial benefits, consolidating the findings that are promising for the researchers and investors focusing on the worldwide equity portfolio allocation based on ESG information.

Using a conventional long-short strategy of going long in high ESG-rated stocks and short in low-rated ESG stocks, we find that the returns of ESG-rating-based portfolios are mostly captured well by common asset pricing factors. This strategy does not generate a statistically or economically significant alpha from the three- and six-factor asset pricing models. However, we find some weak evidence of compromising financial performance when pursuing sustainable investment strategies (negative abnormal returns) in the early 2010s. Our results confirm the general, intuitively appealing contemporaneous finding that the role of ESG information in investment analyses is no longer a new concept. Thus, the advantage (disadvantage) of it in financial outcomes seems not to exist. On the other hand, while integrating ESG metrics into equity portfolios might not provide financial benefits, utilizing them for financial decision-making does not seem to hurt either. This is based on our findings that, first of all, investors pursuing sustainable investment strategies during the early 2010s seem to have compromised the financial performance of their portfolios, reflecting the effect of changes in investors' preferences during this period. However, the performance difference between the high and low-ESG-rated stocks has faded in recent years. In addition, when we investigate the connection between ESG investment performance and unexpected global attention to sustainability issues, we find a significant positive relationship between the attention and performance of portfolios based on ESG scores, particularly when using individual category ratings. Notably, the firms with solid governance performance appear to gain the most advantages when global attention unexpectedly intensifies. Good management practices play a vital role for firms as society's focus on sustainability grows. Additionally, good environmental performance has the potential to benefit investors during periods of heightened attention, supported by substantial evidence from the US market. While the benefit of sustainable investing may vary based on screening dimensions, good ESG practices of firms generally offer advantages for investors during unexpected surges in attention to sustainability.

The remainder of this study is organized as follows. Section 2 presents a short overview of the existing literature on the issue. Section 3 describes the dataset and some concerns about the availability of ESG ratings from the LSEG and the databases. Section 5 presents the performance of ESG-based portfolios. Section 6 discusses the relationship between ESG ratings and returns using cross-section regressions. The conclusions are given in Section 7.

[2] ESG risks, and more widely, climate related risks, have been broadly classified to two groups: physical risks and transition risks (Giglio et al., 2021). Physical risks refer to risks which directly affect the firm's working environment and reduce the quantity and quality of the services provided by the nature via property damage, business disruption, a loss of production or via stranded assets. For example, a long-lasting drought might destroy a major part of the crops while rising sea levels can threaten factories located near the sea. Transition risks stem from possible adaptation policies to more environmentally friendly operations and business models. To move economies on a sustainable path will require actions which will affect the industries having the strongest impact on the ecosystems. A third category, litigation risks, can also be used. These are related to the liability issues taken against those firms which are held responsible for the occurrence of physical and transition risks.

[3] Green/brown stocks are firms with low/high emission intensity calculated as emissions per unit of sales.

2. Literature review

As global investors and stakeholders at the society level increasingly prioritize sustainability, the Environmental, Social, and Governance (ESG) investment premium – higher valuation or lower cost of capital for companies that excel in ESG criteria – has become an attractive research topic in academia. There are at least three theoretical reasons for the existence of the ESG premium, echoing in many respects the ideas from Ardia et al. (2022), Pástor et al. (2021), and Pástor et al. (2022). First, heightened societal awareness of environmental and social issues has increased demand for sustainable investments. Influenced by public opinion and regulatory pressures, investors are more inclined to allocate capital to companies with strong ESG performance. This shift in investment behavior results in higher stock prices and lower borrowing costs for these companies, creating an ESG premium. Secondly, companies with high ESG ratings are often considered less risky by investors because they typically have robust risk control standards. High ESG-rated companies are believed to anticipate future risks and opportunities better regarding long-term value creation and are more disposed to longer-term strategic thinking. Effective management of environmental risks, social responsibilities, and governance structures can lead to more stable and predictable financial performance. Moreover, firms with high ESG ratings exhibit lower idiosyncratic stock market risk (Giese et al., 2019; Tzouvanas and Mamatzakis, 2021) and are usually better prepared to comply with existing and upcoming regulations (Eccles et al., 2014; Grewal et al., 2019). This risk mitigation is attractive to investors, further driving up the valuation of ESG-compliant firms. Finally, consumer preferences have been evolving towards sustainable products and services for a longer period of time. The actual ESG performance of firms might not have a significant role in firm valuation, especially in the most recent data. However, companies aligning with these preferences can capture greater market share and enhance profitability. Hence, public concern may enhance stock market valuation, as consumer-driven demand reinforces the financial benefits of strong ESG performance, contributing to the ESG premium. In other words, society's growing focus on sustainability directly influences the ESG premium by shaping investor behavior, reducing perceived risks, and driving consumer demand.

Despite this, no consensus has been reached on the performance of investment strategies based on ESG criteria (Hornuf and Yüksel, 2023; Widyawati, 2020). Pedersen et al. (2021) argue that the relationship between ESG information and expected returns depends on investors' awareness and preferences. The ESG investing research findings may have been inconsistent because the perceived role of sustainability factors differs across time and markets. Investors can only gain advantages from ESG information when good ESG performance benefits corporations, and this value has not been fully incorporated into stock prices. Therefore, the ESG-return relationship first depends on whether sustainable efforts deliver long-term value within a firm. There are at least two strands of research on the ESG-return relationship: ESG fundamentals and ESG-related expected returns.

A necessary condition for the existence of the role of ESG information affecting abnormal returns is the association between ESG criteria and future fundamentals related to firms' performance (Pedersen et al., 2021). Previous financial literature argues that the ESG information might be affecting a firm's value because good ESG performances could increase its operating efficiency (Eccles et al., 2014; Flammer, 2015), lower the cost of capital (Apergis et al., 2022; Chava, 2014), or improve reputation (Lins et al., 2017). These benefits could explain the relationship between ESG and financial accounting performances (Bahadori et al., 2021; Gillan et al., 2021; Wong et al., 2021). While the ESG efforts can be considered as investments in intangible assets that generate long-horizon returns (Edmans, 2011; Lourenço et al., 2014), these attempts are also associated with a rise in the firm's costs, which sometimes do not bring any financial reward (Krüger, 2015). Although some doubts have not been dispelled, a common view in the literature is that ESG information impacts the market value of firms, and a good ESG performance is linked to better future financial performance.

In terms of the relationship between the ESG information and expected returns, many early studies found a positive relationship between the ESG scores and stock returns (Friede et al., 2015; Kempf and Osthoff, 2007; Statman and Glushkov, 2009). In recent studies, Lioui and Tarelli (2022) and Pedersen et al. (2021) still show that the high-rated firms outperform the low-rated firms. On the other hand, Bang et al. (2023), Bolton and Kacperczyk (2021), Halbritter and Dorfleitner (2015), Hong and Kacperczyk (2009), Long et al. (2024), and Luo (2022), and Ni and Sun (2023) argue against the suggestion that sustainable investing strategies lead to superior financial returns, with higher expected returns of equities involved in more ESG controversies than other comparable stocks. Some studies spice up the literature on sustainable investing with geographical dependence (Badía et al., 2020) and time-varying characteristics (Bansal et al., 2022). Besides, discrepancies in the data from various ESG ratings (Berg et al., 2022) could lead to inconsistencies in the conclusions on ESG investing. Additionally, not all studies use similar criteria to calculate ESG ratings, even though the data are retrieved from the same sources, leading to inconsistent findings. Edmans (2023) argues that ESG-based investments might not generate superior returns since all information should be priced in the return-generating processes in efficient markets, meaning any return differences between sustainable and non-sustainable firms could exist only exist due to mispricing (Badía et al., 2020; Edmans, 2011).

Based on this background, our study adds a new dimension to the discussion on ESG investing by examining whether the ESG ratings still provide financial benefits for investors worldwide if the public concerns on the ESG issues are appropriately accounted for. Assuming modern market participants are aware of the role of ESG performance in companies, ESG-related information should be continuously reflected in stock prices of efficient markets, especially in the most recent data (Edmans, 2023). Even if good ESG-rated stocks neither outperform nor underperform the bad ones in general terms in the latest observations, based on the above discussions, we hypothesize that the *intensification of the public concerns has a role in determining the ESG premium*.

Furthermore, departing from the findings of Ardia et al. (2022), Pástor et al. (2021), and Pástor et al. (2022) for green and brown stocks, this study expands the exploration to firms' overall ESG performance and across rating categories. We hypothesize that high ESG-rated firms particularly benefit when society's attention to sustainability increases unexpectedly. Hence, along with the above given theoretical discussions and the results obtained by Ardia et al. (2022), Pástor et al. (2021), and Pástor et al. (2022), we suggest the following empirical hypotheses to be tested:

H1. ESG investment performance is neutral based on recent data from global financial markets.

H2. Attention to sustainability influences ESG investment performance, with good ESG-rated stocks potentially outperforming poorly rated ones as sustainability attention intensifies.

Using an extensive and comprehensive dataset on stocks in developed markets, we validate and expect to form a solid conclusion about the relationship between ESG performance and expected returns conditioned on attention to sustainability in recent decades.

3. Data

The main data source in this study is the LSEG (previously known as Refinitiv) database. Our dataset encompasses firm-level stock information from 23 developed markets, including only the stocks classified as 'ordinary shares' in the LSEG DataStream, listed on a country-level major stock exchange, and traded in the currency of the listed markets (see Table 1).

The main financial variables (measured in USD) for each equity are the daily total return, market capitalization, and book value of equity. All these data are downloaded from the LSEG Eikon, covering the period 2004–2022. To be included in the sample, a firm must have a market capitalization of at least 50 million USD and a minimum price of 1 USD at the end of the previous year to eliminate all 'nanocap' stocks. All financial variables are winsorized at 0.1 % (grouped by markets) to eliminate any outliers or possible errors when extracting the data.

3.1. ESG performance ratings

ESG rating (from LSEG) metrics provide scores on total ESG and three separate pillars of E, S, and G. The scores range from 0 (Poor) to 100 (Excellent), reflecting the companies' ESG performance. As part of the rating process, the final rating scores are benchmarked against other assets within an industry (E and S pillars) or the country of incorporation (G pillar). The LSEG ESG processes controversial information as a discrete pillar (Controversies pillar) separated from the E, S, and G indicators. Then, the ESG combined score is calculated as the total ESG score minus any controversies. This study focuses on the ESG combined score rather than the total ESG.

The LSEG ESG rating data cover the period from 2002 to 2021. Our ESG dataset ends in 2021 due to a substantial time lag in updating ESG ratings in the LSEG database. For example, at the end of 2023, the latest ESG rating of Apple Inc (Ticker: AAPL) is only updated until 2021 (based on the sustainability reports for the financial year 2021, of which the end date is 25 September 2021, see Figure A1 in the Appendix).[4]

Fig. 1 presents the percentage of total number and capitalization of ESG-rated stocks over time, compared to the non-ESG-rated stocks. Around 50 % of firms in the examined markets have obtained ESG ratings in recent years, so the share has increased greatly from approximately 15 % in 2002. Regarding market capitalization, the companies that have obtained ESG ratings tend to be large firms as they cover most of the sample total capitalization (see Fig. 1). These proportions also increase across the sample period, from 70 % in 2002 to over 90 % in 2021. Other summary statistics for the main variables are presented in Table 2.

3.2. Global attention to sustainability

This paper examines the effects of global attention on ESG investment performance. Following previous studies (Ardia et al., 2022; El Ouadghiri et al., 2021), attention is measured by the volume of media concerning sustainability issues worldwide. The media volume is extracted from the LSEG MarketPsych ESG Analytics (MarketPsych), which captures the daily news containing market perspectives on a country's issues and efforts across the United Nations Sustainable Development Goals.[5] The buzz score from the database is a proxy for discussion volume on conventional news available for 252 countries and territories.[6] In this paper, the indicator for global attention is a sum of buzz variables of all countries available in the MarketPsych database. The global buzz exhibits an upward trend along with the increasing concern about sustainability worldwide (see Fig. 2). In line with Ardia et al. (2022), we focus on the unexpected changes in global attention to sustainability (UGA). We use the first-order autoregressive time series model to estimate the unexpected component of the global buzz. The proxy for the UGA is a prediction error based on regression for the following estimation model:

$$\text{lbuzz}_t = \rho_0 + \rho_1 \times \text{lbuzz}_{t-1} + \omega_t \tag{1}$$

where lbuzz is the logarithm of daily global buzz. For each time t, we estimate the model (1) on a rolling window of 1000 days (from t–1001 to t–1) and use the prediction error, i.e., $\text{lbuzz}_t - (\widehat{\rho}_0 + \widehat{\rho}_1 \times \text{lbuzz}_{t-1})$, for UGA_t. Fig. 2 presents the evolution of media volume buzz and the UGA.

The news volume (buzz) related to sustainability exhibits a clear upward trend, with a peak during the COVID-19 period, along

[4] Additionally, the ESG controversies score is forward-looking. All controversies that occurred in FY1 and FY2 are included in the scoring for FY0. Therefore, a two-year lag should be taken into consideration when using the ESG LSEG ratings to get the final ratings of firms. https://www.lseg.com/content/dam/data-analytics/en_us/documents/methodology/lseg-esg-scores-methodology.pdf. Page 17. (Accessed January 11, 2024).

[5] For example, environmental clean-up efforts, sustainable technology initiatives, education efforts, gender quality efforts, civil engagement, freedom of religion, political opposition activity….

[6] LSEG, 2021, MarketPsych ESG Analytics: quantifying sustainability in global news and social media. https://www.lseg.com/content/dam/marketing/en_us/documents/white-papers/refinitiv-marketpsych-esg-analytics-whitepaper.pdf. (Accessed January 11, 2024).

Table 1
Country coverage.

Country	Stock Exchange (MIC)	Listed Currency	#Firms with LSEG ESG
US	XNAS, XNYS	USD	2799
Australia	XASX	AUD	298
Austria	XWBO	EUR	25
Belgium	XBRU	EUR	47
Canada	XCNQ, XTSE, XTSX	CAD	314
Denmark	XCSE	DKK	63
Finland	XHEL	EUR	63
France	XPAR	EUR	165
Germany	XFRA	EUR	232
Hong Kong	XHKG	HKD	215
Ireland	XDUB	EUR	16
Israel	XTAE	ILS	16
Italy	XMIL	EUR	115
Japan	XJPX	JPY	479
New Zealand	XNZE	NZD	46
Norway	XOSL	NOK	81
Portugal	XLIS	EUR	13
Singapore	XSES	SGD	45
Spain	BMEX	EUR	68
Sweden	XSTO	SEK	261
Switzerland	XSWX	CHF	163
Netherlands	XAMS	EUR	48
UK	XLON	GBP	493
Total			**6065**

Note: The table presents the sample distribution of equities in terms of markets included in the sample. For each country, we detail the country's major exchange, listed currency, and number of firms with LSEG ESG ratings.

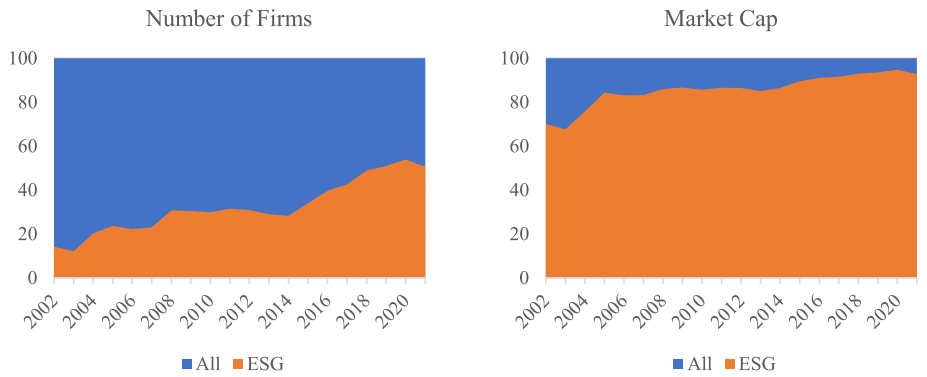

Fig. 1. ESG firms share. Note: The figures show the number and total market cap of ESG firms in percentage compared to all listed stocks in 23 examined markets. Firm-level data is taken in December of each year.

Table 2
Descriptive statistics.

	N	Mean	SD	Min	Max	Period	Frequency
Return in USD (%)	11,849,380	0.04	2.61	–33.77	52.95	2004–2022	Daily
Market value (Billion USD)	11,849,380	13.13	45.17	0.05	2973.02	2004–2022	Daily
Book-to-Market	11,849,380	0.67	0.83	0.01	14.29	2004–2022	Daily
ESG (combined)	48,772	42.75	19.27	0.40	95.18	2002–2021	Yearly
E	48,765	35.89	29.38	0.00	99.14	2002–2021	Yearly
S	48,765	44.61	23.20	0.19	98.47	2002–2021	Yearly
G	48,772	50.62	22.26	0.10	99.44	2002–2021	Yearly

Note: The table presents sample summary statistics of ESG firms. The two last columns show the coverage period and frequency of each variable.

with the increasing concern about sustainability in society (see Fig. 2). We also see that the increases in news volume corresponded to crucial events concerning sustainability, such as the 2005 United Nations Climate Change Conference, the 2012 United Nations Conference on Sustainable Development, and the Paris Agreement. Noticeably, US President Donald Trump's announcement about the US withdrawing from the Paris Agreement initiated a spike in media attention. It is also observable that the interest in sustainability

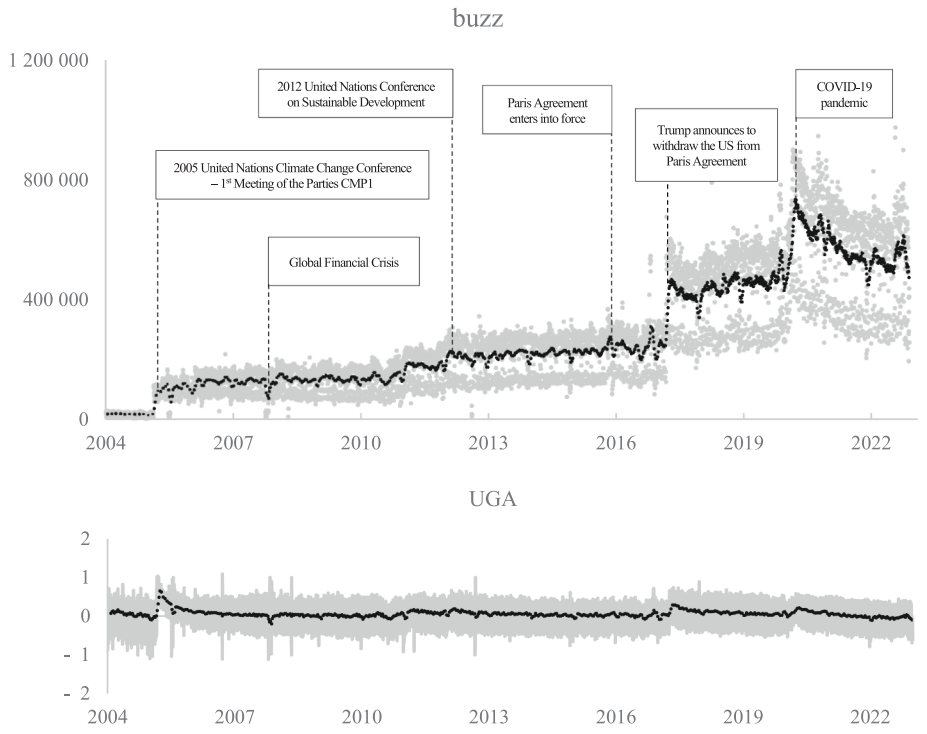

Fig. 2. Daily media volume and global attention shocks. Note: The figures show sustainability-related media volume (buzz – gray points) and unexpected global attention to sustainability (UGA – gray line) from 2004 to 2022. Bold lines illustrate the 30-day moving averages.

was reduced during the global financial crisis.

4. Methodology

We examine the performance of ESG investments with value-weighted[7] portfolios sorted on the individual firms' ESG ratings. At the beginning of each year, equities are ranked according to their ESG ratings[8] of the previous year (ESG ratings of the previous two years are also utilized for robustness tests). Based on the rankings, the top (bottom) 25 % of stocks based on their ESG ranks are allocated into high (low) ESG portfolios accordingly.[9] The portfolios are maintained for one year and rebalanced annually based on new ranking at the beginning of each year. Then, we construct the high-low portfolios by subtracting the returns of low ESG-ranked portfolios from those of high ESG-ranked portfolios to simulate an investment strategy of going long in the high-rated ESG stocks and short in the low-rated ESG stocks. Our yearly LSEG ESG sample covers the 2002–2021 period, and the daily portfolio returns series data span from 2004 to 2022.

We evaluate the performance of sustainable portfolios based on the ESG ratings by the six-factor model (Fama and French, 2018), which has been previously asserted to be effective for the pricing of equities and seems superior to other asset pricing models (Grobys and Kolari, 2022). More specifically, we estimate the following models:

$$r_{pt} - r_{ft} = \alpha_p + \beta_p RM_t + s_p SMB_t + h_p HML_t + r_p RMW_t + c_p CMA_t + m_p MOM_t + \varepsilon_{pt} \quad (2)$$

where $r_p - r_f$ is the daily excess return of portfolio p (in USD); r_f is the risk-free rate, proxied by the 30-day US Treasury bill rate; RM, SMB, HML, RMW, CMA are the five Fama-French factors, where RM is the market excess returns, SMB is the difference between the returns of portfolios of small and large stocks, HML is the same for high and low book-to-market stocks, RMW is for the stocks with robust and weak profitability, CMA is for low and high investment firm's stocks; MOM refers to the momentum factor; and ε_p is error. The standard errors are estimated using the Newey and West's (1987) procedure, which corrects the estimated standard errors for heteroscedasticity and autocorrelation in the residuals. The data for the (developed markets) factors are obtained from Kenneth

[7] We form value-weighted portfolios to avoid over-representing small- and micro-cap equities since the dataset in the study covers most stocks in the examined markets.

[8] We rank firms across markets rather than group them within a country or an industry since the ratings are already adjusted in relation to other stocks in a country and in an industry according to the LSEG.

[9] The 25% cut-off is chosen as it is similar to the threshold in the LSGE ESG scoring framework.

French's data library.[10]

To further examine the performance of ESG investments when the global attention to sustainability changes unexpectedly, we estimate the augmented factor model, following Ardia et al. (2022), as follows:

$$r_{pt} - r_{ft} = \alpha_p + \beta_p^{UGA} UGA_t + \beta_p RM_t + s_p SMB_t + h_p HML_t + r_p RMW_t + c_p CMA_t + m_p MOM_t + \varepsilon_{pt} \quad (3)$$

where UGA is the unexpected changes in global attention to sustainability.

5. ESG portfolio performance

5.1. Performance of high vs. low ESG rating stocks

This section summarizes long-short portfolios based on ESG ratings over nearly two decades. We construct portfolios using all ESG stocks across 23 developed markets and only the US and non-US firms to consolidate the findings, as the US firms account for a substantial proportion of the sample.

Table 3 presents the abnormal returns (alphas) estimated from the six-factor model (2). The portfolios are sorted by using the ESG ratings from the previous (y-1) year or from two years ago (y-2) year(s). The results show that the low-rated portfolios have higher returns than the high-rated ones, based on the overall ESG and E ratings. These results show no evidence that the ESG investment provides superior outcomes in the whole sample. Going long in stocks with high ESG ratings and short in stocks with low ESG generates no financial benefits, with some probability of sacrifice (negative abnormal returns) when pursuing this ESG investment strategy. These results are in line with Bolton and Kacperczyk (2021), Halbritter and Dorfleitner (2015), and Luo (2022).

However, applying a higher hurdle —a t-statistic of 3.0— recommended by Harvey et al. (2016), the performance differences between the high- and low-rated portfolios no longer exist. Accordingly, firms with high ESG ratings neither over- nor underperform those with low ESG ratings regarding abnormal returns, and screening stocks based purely on their ESG ratings does not always result in favorable performance. Assessing the abnormal returns based on this hurdle, the results indicate that the ESG portfolio returns are explained by well-known risk factors, suggesting the non-existence of an ESG risk premium. Hence, the ESG performances (captured by the LSEG ratings) may be strongly related to well-known firms' fundamentals and entirely reflected in the stock prices, supporting the argument of Edmans (2023). These results imply that the ESG investment performance is relatively neutral. If the abnormal returns of high-low ESG portfolios are significant, they are likely to be negative rather than positive, in line with Long et al. (2024).

We also divided the study period into three sub-periods: 2004–2009, 2010–2015, and 2016–2022. The first breaking point marks the start of the period in which sustainability reports become standardized and investor-oriented (Hales, 2023). The shift was facilitated by the establishment of reporting frameworks by two major organizations, the Integrated International Reporting Council (founded in 2010) and the Sustainability Accounting Standards Board (founded in 2011). These initiatives underscore investors' growing emphasis and interest in sustainability information, supplementing conventional financial data. The second breaking point is the Paris Agreement of December 2015, signifying the first global action on sustainable initiatives. In the most recent sub-period, 2016–2022, there was a noticeable push from regulators for mandatory corporate sustainability reporting, evidenced by the creation of EU sustainability reporting standards and SEC sustainability reporting, shaping the path to compulsory disclosure.

The results for sub-samples align with the previous discussions as the estimated results indicate weak evidence of the difference between high-rated vs. low-rated portfolios' performance. The factor model appears to describe the fluctuation of expected returns of the ESG-rated portfolios relatively accurately during the first subsample of 2004–2009. The ESG investment strategy in this period is neutral and did not provide advantages in financial performance, contrasting the early findings about obtaining profit from the simple approach of buying stocks with high ESG and selling those with low ratings (Kempf and Osthoff, 2007). However, the sample period, which is the late decade of the 1990s in the study of Kempf and Osthoff (2007), is different from ours. Along with the normalization of sustainability information from the early 2000s (Hales, 2023) and its usage in investments, in our more recent data, ESG information is more efficiently reflected in stock prices, eliminating the correlation between ESG performance and expected returns in the first subsample. However, in our next subsample of 2010–2015, many negative and significant alphas are observed in the estimation results, illustrating a pattern whereby the low ESG-rated equities might outperform their high-rated counterparts. This outcome seems to be attributed to the shifts in investors' preference due to non-pecuniary reasons or the views of high ESG rating and lower risks, driving up the demand for high ESG stocks, in line with the theoretical frameworks by Pástor et al. (2021) and Pedersen et al. (2021). As seen in Table 4, the sustainable investments under management increased substantially in the first half of the 2010s. From 2012 to 2014, the total value of sustainable investments increased by more than 60 %, the highest growth in the recent decade. The ratio of sustainable investment over total assets also went up by around nine percentage points, equivalent to an increase of 40 %. As the tastes for sustainable stocks increase, the high ESG-rated firms' stock prices rise, leading to lower expected returns. However, from 2020 to 2022, sustainable investment has declined in total value and the ratio to total investment assets under management. Regarding ESG investment performance, in the latest sub-period, 2016–2022, the connection between ESG rating and returns has faded (see the last two columns in Table 3) as the markets seem to already price in the sustainability information when the ESG criteria have become well-acknowledged in the society, and sustainability disclosures are consolidated, in line with Edmans (2023).

Generally, while some negative abnormal returns are observed from the results, there is no substantial support that the high ESG-

[10] https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

Table 3
Payoffs of ESG portfolios.

		2004–2022		2004–2009		2010–2015		2016–2022	
		y-1	y-2	y-1	y-2	y-1	y-2	y-1	y-2
ESG	All	−0.01**	−0.01	0.00	0.01	−0.03***	−0.02**	0.00	−0.01
		(-2.05)	(-1.59)	(-0.27)	(0.76)	(-3.18)	(-2.19)	(0.04)	(-1.17)
	US	−0.02***	−0.01	−0.01	0.00	−0.02***	−0.02**	−0.01	0.00
		(-2.93)	(-1.07)	(-0.92)	(-0.07)	(-3.20)	(-2.07)	(-1.31)	(-0.20)
	Non-US	−0.01	−0.01	−0.01	0.00	−0.03***	−0.02**	0.01	0.00
		(-1.35)	(-1.08)	(-0.94)	(0.11)	(-2.64)	(-2.24)	(0.88)	(-0.16)
E	All	−0.01***	−0.01*	−0.01	0.00	−0.03***	−0.03***	−0.01	−0.01
		(-2.74)	(-1.89)	(-0.87)	(0.35)	(-3.67)	(-3.24)	(-0.94)	(-1.21)
	US	−0.01**	−0.01*	−0.02	−0.01	−0.02**	−0.01	0.00	−0.01
		(-2.17)	(-1.69)	(-1.62)	(-0.73)	(-2.39)	(-1.51)	(-0.04)	(-0.69)
	Non-US	−0.02***	−0.02***	−0.02*	−0.01	−0.04***	−0.04***	−0.01	−0.01
		(-3.02)	(-2.61)	(-1.65)	(-1.03)	(-2.87)	(-3.13)	(-1.21)	(-0.95)
S	All	−0.01	−0.01	−0.01	0.00	−0.02***	−0.02**	0.00	0.00
		(-1.52)	(-1.29)	(-0.99)	(0.03)	(-2.70)	(-2.44)	(0.69)	(-0.38)
	US	0.00	−0.01	0.00	−0.01	−0.01	−0.01	0.00	−0.01
		(-0.81)	(-1.43)	(-0.42)	(-1.00)	(-1.19)	(-1.11)	(-0.41)	(-0.71)
	Non-US	−0.01	−0.01	−0.01	0.00	−0.04***	−0.04**	0.01	0.00
		(-1.48)	(-1.16)	(-0.77)	(0.11)	(-2.65)	(-2.56)	(0.45)	(0.23)
G	All	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
		(-0.34)	(-0.10)	(0.30)	(1.21)	(-0.36)	(-0.31)	(-0.13)	(-0.71)
	US	−0.01	−0.01	0.00	0.00	−0.01	−0.01	0.00	−0.01
		(-1.49)	(-1.25)	(-0.24)	(0.26)	(-1.48)	(-0.82)	(-0.48)	(-1.06)
	Non-US	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00
		(0.65)	(0.54)	(0.09)	(0.66)	(0.80)	(0.55)	(0.45)	(-0.20)

Note: The table shows the estimated alphas from regressions using the six-factor model (2) for high-low portfolios going long/short in high/low-rated (top/bottom 25%) ESG stocks. Stocks are ranked using ESG ratings (total and pillar scores) in December of the previous one (y-1) or two (y-2) year(s). Portfolio returns are value-weighted. Results are reported for all firms, the US firms, and non-US firms across full and sub-sample. Values in the parentheses indicate the Newey-West adjusted t-statistic. ***, **, and * indicate the significant level of 1 %, 5 %, and 10 %.

Table 4
Growth of sustainable investments under management worldwide.

	2012	2014	2016	2018	2020	2022
Total sustainable investments under management (USD billions)	13 261	21 358	22 872	30 683	35 301	30 321
Growth of total sustainable investments		61.06 %	7.09 %	34.15 %	15.05 %	−14.11 %
% Sustainable investments relative to total managed assets	21.5 %	30.2 %	27.9 %	33.4 %	35.9 %	24.4 %
Increase of % sustainable investments		40.47 %	−7.62 %	19.71 %	7.49 %	–32.03 %

Note: The table presents the growth of global sustainable investment in terms of value and the ratio over total investment. Sources: Global Sustainable Investment Alliance (GSIA) Global Sustainable Investment Review 2022 and GSIA Global Sustainable Investment Review 2014.

rated portfolios exhibit better or worse performance than their low ESG-rated counterparts. The ESG-rating vs. return relationship seems to be attributed to mispricing or increased demand for socially responsible stocks. When the sustainability information is captured in the stock prices, there is no difference in the expected returns of low and high ESG stocks in the developed markets. On the positive side, the finding implies that while the ESG investing strategy does not generate additional financial benefit, investors could nowadays pursue sustainable goals without sacrificing financial performance.

5.2. ESG portfolio returns and unexpected global attention to sustainability

Recent studies (Ardia et al., 2022; Bansal et al., 2022; Pástor et al., 2022) suggest that sustainable investment performance is contingent. Empirical evidence indicates that green stocks tend to outperform brown stocks when concerns about climate change intensify. This observation aligns with the assumption of rising demand for sustainable stocks attributed to investors' preferences and awareness shifts (Edmans, 2023; Pedersen et al., 2021). While the likelihood of observing the differences between the returns of high- and low-ESG firms is low, given that ESG information is already factored into market prices, ESG investment performance could still be influenced by societal attention and perspective on sustainability issues. In this section, we extend the previous findings, which mainly focus on the emission criterion, to a more general discussion on ESG investment performance, conditioning on the global attention to sustainability.

The ESG portfolio returns are assessed by the model (3), the six-factor model augmented with the UGA (calculated as in Section 3.2) being proxied to measure shocks to global attention to sustainability. Table 5 reports estimated alphas and UGA coefficients from the estimations for long-short portfolios across various sample periods. The results show that the changes in attention to sustainability are weakly related to portfolios based on total ESG ratings but more associated with those using pillar scores. The relationship is particularly prominent since 2010. Estimated coefficients for the UGA suggest that increasing global attention is good for sustainable stocks. While the results for the E pillar align with the previous findings (Ardia et al., 2022; Pástor et al., 2022), the UGA coefficients are significant for the US firms but become insignificant when expanding the sample to other developed markets during the recent year from 2016 to 2022. A one-unit increase in UGA relates to an additional approximately ten basis points in daily return for high-low E portfolios in the US. However, this effect appears neutral when considering all markets, raising questions about the generalizability of conclusions to the broader market context. On the other hand, G-based portfolios exhibit the highest sensitivity to attention shocks, and the relation also holds across all developed markets. Companies with strong G performance demonstrate a significant advantage when global sustainability attention intensifies, highlighting the vital role of management quality within companies.

To consolidate the findings, besides utilizing the model (3), we assess the ESG-based portfolios using the Fama and French three-factor model, the Fama and French five-factor model, the q5 model (Hou et al., 2021), and the four-factor model with mispricing factors (Stambaugh and Yuan, 2017) augmented with the UGA. The results are in Table A1 in the Appendix. In general, the results are consistent with the findings based on the six-factor model (3), weak relationships between the attention to sustainability and the return of ESG portfolios, except for portfolios based on G performance.

5.3. ESG category ratings

In addition to using the overall ESG ratings, portfolios are also created based on the scores at the category level. The LSEG ESG rating framework consists of ten categories rolled up into three pillars: Environmental (Emission, Innovation, and Resource Use), Social (Community, Human Rights, Product Responsibility, and Workforce), and Governance (CSR Strategy, Management, and Shareholders).[11] The portfolio returns are assessed by the six-factor model augmented with the UGA, the equation (3). Besides the estimation using the entire sample, the results for sub-samples (2004–2009, 2010–2015, and 2016–2022) are also reported, aligning with the previous section. Table 6 presents the estimated alphas and UGA coefficients for long-short portfolios based on category ratings.

The results generally show a pattern similar to the overall ESG scores, with pronounced effects during the period 2010–2015. Regressions for high-low portfolios using category ratings also give negative alphas, which are strongly statistically significant, implying that the firms with good ESG performance yield lower average returns than the low ESG-rated companies. The positive and significant estimates for UGA coefficients imply the advantage of good ESG performance during the increasing attention period, particularly during the two later sub-samples from 2010 and for the G pillar. The association between ESG ratings, attention to sustainability, and stock returns was relatively weak during 2004–2009. However, it became substantial from 2010 to 2015 before weakening again in the recent period of 2016–2022. The results for G portfolios appear to be more substantial, as significant positive UGA estimates can be observed in most categories under the G pillar across the sample period, with the most prominent results for the management score. This evidences the value of governance and management quality of firms from investors' viewpoint, along with the increasing attention to sustainability. Regarding categories under the E pillar, the results exhibit similar patterns to the outcomes in the previous section. Significant UGA coefficients are mainly from the US market, and the results are driven by emission and resource use indicators rather than innovation criteria when using the whole sample. Greater attention – better ESG investment performance tendency is also observed for categories under the S pillar, with the connection being more evident from 2010. However, these conditional associations between stock returns and E or S ratings are relatively weak from 2016 to 2022.

These results show that an unexpected increase in global attention to sustainability is good news for high ESG stocks. During the days when the attention shocks UGA is larger than a specific threshold (for example, 0.3 in the case of management-score-based portfolios), good firms outperform bad firms.

6. Global attention in the cross-section of stock returns

To consolidate whether the ESG investment performance is associated with unexpected changes in the global attention to sustainability, we perform regressions on stock-level returns and UGA. In this section, we estimate the firm fixed-effect panel model (following Ardia et al., 2022) as follows:

$$ER_{i,t} = \delta_{ESG} ESG_{i,t} + \delta_{UGA} UGA_t + \gamma ESG_{i,t} \times UGA_t + \sum_{k=1}^{n} D_k (a_k + \beta_k RM_t + s_k SMB_t + h_k HML_t + r_k RMW_t + c_k CMA_t + m_k MOM_t) + \theta_{i,t} \quad (4)$$

where ER_i is the daily excess return of stock i over risk-free rate; ESG_i is the standardized (across firms) ESG rating of stock i available at the previous year-end; UGA is the unexpected changes in the global attention to sustainability; D_k is the dummy variable which gets the

[11] https://www.lseg.com/content/dam/data-analytics/en_us/documents/methodology/lseg-esg-scores-methodology.pdf. Page 9. (Accessed June 24, 2024).

Table 5
ESG premium and global attention to sustainability.

		2004–2022		2004–2009		2010–2015		2016–2022	
		Alpha	UGA	Alpha	UGA	Alpha	UGA	Alpha	UGA
ESG	All	−0.02	0.03	−0.01	0.06	−0.05***	0.10*	0.01	−0.02
		(-1.58)	(0.67)	(-0.89)	(0.93)	(-3.11)	(1.67)	(0.29)	(-0.34)
	US	−0.03***	0.05	−0.03	0.07	−0.04***	0.08	−0.01	0.00
		(-2.60)	(1.26)	(-1.36)	(1.08)	(-2.62)	(1.53)	(-0.69)	(0.00)
	Non-US	−0.02*	0.05	−0.01	0.00	−0.07***	0.18**	−0.01	0.08
		(-1.73)	(1.11)	(-0.54)	(-0.03)	(-3.13)	(2.04)	(-0.50)	(1.06)
E	All	−0.02*	0.03	−0.02	0.07	−0.06***	0.11**	0.01	−0.02
		(-1.73)	(0.60)	(-1.43)	(1.20)	(-3.65)	(2.04)	(0.29)	(-0.34)
	US	−0.02**	0.04	−0.02	0.03	−0.04***	0.11**	−0.02	0.11*
		(-2.10)	(1.07)	(-1.63)	(0.68)	(-2.81)	(2.05)	(-1.57)	(1.96)
	Non-US	−0.03**	0.03	−0.03	0.06	−0.08***	0.19*	0.01	−0.09
		(-2.06)	(0.60)	(-1.56)	(0.78)	(-3.11)	(1.90)	(0.26)	(-1.10)
S	All	−0.01	0.02	−0.01	−0.04	−0.07***	0.19***	0.00	0.04
		(-1.17)	(0.39)	(-0.25)	(-0.54)	(-3.88)	(2.74)	(-0.37)	(0.84)
	US	−0.02	0.05	0.00	−0.01	−0.03**	0.10*	−0.02*	0.10*
		(-1.54)	(1.38)	(-0.10)	(-0.27)	(-2.02)	(1.76)	(-1.74)	(1.77)
	Non-US	−0.03*	0.06	−0.01	−0.03	−0.10***	0.26**	−0.02	0.11
		(-1.79)	(1.04)	(-0.22)	(-0.32)	(-3.27)	(2.15)	(-0.81)	(1.23)
G	All	−0.02***	0.10***	−0.01	0.07*	−0.03***	0.13***	−0.03**	0.13***
		(-3.18)	(3.77)	(-1.17)	(1.83)	(-2.98)	(3.36)	(-2.38)	(2.96)
	US	−0.04***	0.13***	−0.02	0.09*	−0.04***	0.11**	−0.05***	0.22***
		(-3.86)	(3.98)	(-1.54)	(1.86)	(-2.60)	(2.33)	(-2.94)	(3.48)
	Non-US	−0.01	0.06**	−0.01	0.04	−0.03**	0.15***	−0.01	0.08
		(-1.22)	(1.98)	(-0.56)	(0.82)	(-2.08)	(3.11)	(-0.94)	(1.37)

Note: The table shows the estimated alphas and UGA coefficients from regressions using the six-factor model augmented with UGA (3) for high-low portfolios going long/short in high/low-rated (top/bottom 25%) ESG stocks. Stocks are ranked using ESG ratings (total and pillar scores) in December of the previous year. Portfolio returns are value-weighted. Results are reported for all firms, the US firms, and non-US firms across full and sub-sample. Values in the parentheses indicate the Newey-West adjusted t-statistic. ***, **, and * indicate the significant level of 1 %, 5 %, and 10 %.

value of 1 when k = i and 0 otherwise; n is the number of stocks; RM, SMB, HML, RMW, CMA, and MOM are asset pricing factors; and θ_i is error. In the model (4), coefficients δ_{ESG}, δ_{UGA}, and γ are common to all stocks, while a_k, β_k, s_k, h_k, r_k, c_k, and m_k are firm-specific asset pricing alpha and factor loadings.

Table 7 presents regression results for the main interested coefficients δ_{ESG}, δ_{UGA}, and γ. The standardized ESG variables are calculated based on total and pillar scores. The estimations are performed for the whole sample, the US, and non-US markets across the full sample period and sub-samples (2004–2009, 2010–2015, and 2016–2022). Generally, we find estimates for coefficient γ to be positive and highly significant for the whole sample and two sub-samples from 2010. These results are in line with the previous section based on portfolio-sorting, and further support the positive relationship between global attention to sustainability and ESG investment performance. Using the standardized ESG ratings in the regression models, the results imply that the highest- and lowest- ESG-rating firms tend to be more sensitive to attention shocks. The negative estimated coefficient δ_{ESG} implies the negative association between ESG ratings and returns after controlling for the global attention to sustainability. As seen in Table 7, significant results are observed in most estimations for both the US and non-US markets. The difference from the previous section is that model (4) estimation utilizes all available firm-day observations rather than only the top/bottom. Nonetheless, the results reported in this section further support the assumption that the ESG-return connection varies depending on the concern and attention of markets to related issues — a positive shock in attention to sustainability links to improving ESG investment performance.

We also conduct Fama–MacBeth regressions. Details and results are presented in Table A2 in the Appendix. The results further support the weak relationship between ESG performance and stock returns, and the global attention to sustainability seems to moderate this relationship, with more significant results observed during the subperiod 2010–2015.

7. Conclusion

The increasing popularity of ESG investing has sparked considerable interest in the performance of portfolios aligned with sustainability criteria. With the growing availability of ESG information, investors can now readily incorporate ESG integration into their portfolio allocation processes. Our results demonstrate that selecting stocks based on ESG ratings neither yields superior nor significantly inferior financial performance, as markets have fully integrated ESG information into stock prices. However, this implies ESG engagements are not necessarily involved in financial compromise. Therefore, reaching financial and sustainable goals together might be possible for investors.

Table 6
Payoffs of ESG portfolios across ESG categories.

	E			S				G		
	Emission	Environmental Innovation	Resource Use	Community	Human Rights	Product Responsibility	Workforce	CSR Strategy	Management	Shareholders
Alpha										
2004–2022										
All	−0.03***	−0.02**	−0.03**	−0.01	−0.01	−0.01**	−0.02*	−0.04***	−0.02**	−0.01
	(-3.15)	(-2.16)	(-2.40)	(-0.85)	(-1.55)	(-2.06)	(-1.93)	(-3.88)	(-2.35)	(-1.26)
US	−0.03***	−0.01	−0.02***	−0.01	−0.01	0.00	−0.02**	−0.04***	−0.02**	0.00
	(-3.56)	(-1.19)	(-2.58)	(-1.54)	(-1.01)	(-0.53)	(-2.22)	(-3.96)	(-2.38)	(-0.46)
Non-US	−0.03**	−0.02**	−0.03**	−0.01	−0.02*	−0.02**	−0.02	−0.03**	−0.01	−0.01
	(-2.15)	(-2.39)	(-1.98)	(-1.04)	(-1.93)	(-2.39)	(-1.46)	(-2.33)	(-0.96)	(-1.32)
2004–2009										
All	−0.02	−0.02	−0.02	0.00	0.00	0.00	−0.01	−0.02	−0.01	0.00
	(-1.10)	(-1.40)	(-1.13)	(-0.16)	(0.01)	(-0.41)	(-0.73)	(-1.64)	(-0.79)	(-0.13)
US	−0.02	−0.02	−0.03*	−0.03**	0.00	0.00	−0.02	−0.02*	−0.01	0.02
	(-1.42)	(-1.07)	(-1.86)	(-2.23)	(0.01)	(0.21)	(-1.36)	(-1.66)	(-0.43)	(1.10)
Non-US	−0.02	−0.03*	−0.02	0.01	−0.01	−0.01	0.00	−0.02	−0.01	−0.02
	(-1.31)	(-1.68)	(-0.81)	(0.39)	(-0.31)	(-0.61)	(-0.01)	(-1.29)	(-0.55)	(-1.29)
2010–2015										
All	−0.05***	−0.01	−0.05***	−0.08***	−0.04***	−0.01	−0.05***	−0.06***	−0.02	−0.01
	(-3.33)	(-0.92)	(-3.34)	(-2.95)	(-2.92)	(-1.04)	(-2.61)	(-4.09)	(-1.64)	(-0.94)
US	−0.05***	−0.02	−0.05***	−0.02	−0.04***	0.00	−0.03*	−0.06***	−0.02	−0.02
	(-3.72)	(-1.59)	(-3.12)	(-1.63)	(-2.96)	(-0.14)	(-1.73)	(-3.69)	(-1.17)	(-1.29)
Non-US	−0.07***	−0.03*	−0.08***	−0.07***	−0.07***	−0.05***	−0.08***	−0.07***	−0.02*	0.02*
	(-3.30)	(-1.75)	(-3.23)	(-3.07)	(-2.94)	(-3.23)	(-2.64)	(-4.05)	(-1.87)	(1.65)
2016–2022										
All	−0.02	−0.02	−0.01	−0.01	0.00	−0.02**	−0.01	−0.02*	−0.03**	−0.03**
	(-1.32)	(-1.59)	(-0.63)	(-0.62)	(-0.34)	(-2.00)	(-0.60)	(-1.94)	(-2.42)	(-2.28)
US	−0.02*	−0.02	−0.01	0.00	−0.01	−0.01	−0.02	−0.03**	−0.04***	−0.03
	(-1.74)	(-1.21)	(-0.94)	(-0.36)	(-0.38)	(-0.90)	(-1.49)	(-2.26)	(-2.64)	(-1.57)
Non-US	0.01	−0.01	−0.01	−0.01	−0.02	−0.02	−0.02	0.00	−0.01	−0.01
	(0.35)	(-0.85)	(-0.30)	(-0.75)	(-0.97)	(-1.45)	(-1.04)	(-0.21)	(-0.61)	(-0.89)
UGA										
2004–2022										
All	0.08**	0.04	0.08**	0.00	0.04	0.04	0.05	0.11***	0.08***	0.05*
	(2.16)	(1.34)	(1.99)	(0.07)	(1.22)	(1.48)	(1.11)	(3.36)	(3.45)	(1.79)
US	0.08**	0.02	0.08***	0.04	0.03	0.01	0.07**	0.10***	0.10***	0.05

(*continued on next page*)

Table 6 (*continued*)

	E			S				G		
	Emission	Environmental Innovation	Resource Use	Community	Human Rights	Product Responsibility	Workforce	CSR Strategy	Management	Shareholders
	(2.56)	(0.58)	(2.59)	(1.32)	(1.13)	(0.19)	(1.98)	(3.32)	(3.29)	(1.56)
Non-US	0.04	0.04	0.04	0.02	0.07	0.07**	0.03	0.05	0.06**	0.01
	(0.91)	(1.20)	(0.73)	(0.42)	(1.39)	(2.12)	(0.53)	(1.29)	(2.15)	(0.30)
2004–2009										
All	0.09	0.08	0.09	0.11	0.02	0.00	0.02	0.10*	0.06	0.04
	(1.53)	(1.50)	(1.48)	(1.18)	(0.44)	(0.03)	(0.27)	(1.87)	(1.57)	(0.87)
US	0.07	0.03	0.10**	0.07	0.00	0.03	0.05	0.05	0.05	0.02
	(1.55)	(0.57)	(2.46)	(1.50)	(0.09)	(0.73)	(0.97)	(1.21)	(1.13)	(0.48)
Non-US	0.05	0.07	0.02	0.08	0.01	0.02	−0.07	0.04	0.05	0.04
	(0.79)	(1.51)	(0.37)	(1.30)	(0.21)	(0.45)	(-0.72)	(0.80)	(1.10)	(0.71)
2010–2015										
All	0.11*	−0.02	0.10*	0.25**	0.12**	0.02	0.08	0.15***	0.06	0.06
	(1.93)	(-0.34)	(1.88)	(2.36)	(2.19)	(0.30)	(1.17)	(2.90)	(1.48)	(1.46)
US	0.14***	0.04	0.16***	0.11**	0.16***	−0.04	0.07	0.17***	0.03	0.08
	(3.01)	(0.93)	(3.06)	(2.14)	(3.53)	(-0.50)	(1.52)	(3.27)	(0.50)	(1.35)
Non-US	0.20**	0.06	0.19**	0.18**	0.21**	0.18***	0.20	0.19***	0.14***	0.09
	(2.36)	(0.87)	(2.03)	(2.14)	(2.17)	(2.87)	(1.54)	(2.91)	(2.94)	(1.54)
2016–2022										
All	0.04	0.08	0.05	0.08	0.02	0.08**	0.04	0.09**	0.15***	0.12**
	(0.84)	(1.58)	(0.91)	(1.05)	(0.41)	(2.05)	(0.95)	(2.00)	(4.05)	(2.53)
US	0.08*	0.09*	0.06	0.02	0.04	0.08*	0.09*	0.11***	0.22***	0.15**
	(1.66)	(1.88)	(1.27)	(0.33)	(0.81)	(1.65)	(1.95)	(2.60)	(4.38)	(2.30)
Non-US	−0.06	0.02	−0.04	0.08	0.10	0.08	0.09	0.01	0.06	0.00
	(-0.84)	(0.35)	(-0.56)	(1.13)	(1.15)	(1.40)	(1.22)	(0.13)	(1.14)	(0.10)

Note: The table shows the estimated alphas and UGA coefficients from regressions using the six-factor model augmented with UGA (3) for high-low portfolios going long/short in high/low-rated (top/bottom 25 %) ESG stocks. Stocks are ranked using ESG ratings (category scores) in December of the previous year. Portfolio returns are value-weighted. Results are reported for all firms, the US firms, and non-US firms across full and sub-sample. Values in the parentheses indicate the Newey-West adjusted t-statistic. ***, **, and * indicate the significant level of 1 %, 5 %, and 10 %.

Table 7
Panel regression results.

		ESG	UGA	ESG×UGA	ESG	UGA	ESG×UGA
		2004–2022			2004–2009		
ESG	All	−0.02***	−0.07***	0.03***	0.00	0.06***	0.01
		(−13.67)	(−16.20)	(5.56)	(−0.47)	(6.10)	(1.30)
	US	−0.01***	0.06***	0.00	0.00	0.04***	0.02
		(−3.74)	(6.35)	(0.07)	(0.06)	(2.99)	(1.28)
	Non-US	−0.03***	−0.09***	0.04***	−0.01**	0.06***	0.01
		(−14.19)	(−14.98)	(6.67)	(−2.27)	(5.27)	(0.87)
E	All	−0.02***	−0.07***	0.03***	0.00	0.06***	0.02**
		(−13.67)	(−16.12)	(6.28)	(−0.81)	(6.15)	(2.50)
	US	−0.01***	−0.03***	0.01*	−0.01	0.04***	0.00
		(−4.63)	(−5.03)	(1.91)	(−0.85)	(3.00)	(0.28)
	Non-US	−0.04***	−0.09***	0.05***	−0.02***	0.06***	0.03***
		(−16.10)	(−15.06)	(7.86)	(−2.76)	(5.34)	(2.79)
S	All	−0.02***	−0.07***	0.02***	0.00	0.06***	0.01
		(−13.22)	(−16.18)	(4.94)	(0.42)	(6.15)	(0.88)
	US	−0.01***	−0.03***	0.00	0.01	0.04***	0.00
		(−3.49)	(−5.00)	(0.14)	(0.82)	(2.99)	(0.10)
	Non-US	−0.03***	−0.09***	0.03***	−0.01	0.06***	0.01
		(−13.31)	(−14.95)	(5.76)	(−1.37)	(5.31)	(0.79)
G	All	−0.01***	−0.13***	0.04***	0.00	0.06***	0.02*
		(−7.66)	(−24.38)	(6.87)	(−0.61)	(6.10)	(1.74)
	US	−0.01***	−0.03***	0.02***	0.00	0.04***	0.02*
		(−3.41)	(−4.93)	(2.98)	(0.91)	(2.99)	(1.66)
	Non-US	−0.01***	−0.09***	0.03***	0.00	0.06***	0.01
		(−7.51)	(−14.51)	(5.10)	(−1.00)	(5.30)	(0.74)
		2010–2015			2016–2022		
ESG	All	−0.03***	−0.20***	0.03***	−0.03***	−0.09***	0.03***
		(−6.85)	(−25.24)	(3.84)	(−10.4)	(−14.13)	(4.26)
	US	−0.02***	−0.05***	0.03***	−0.01***	−0.05***	0.01
		(−3.52)	(−5.14)	(2.75)	(−3.15)	(−5.48)	(1.31)
	Non-US	−0.03***	−0.28***	0.05***	−0.05***	−0.14***	0.07***
		(−6.51)	(−25.9)	(4.13)	(−13.58)	(−15.30)	(7.29)
E	All	−0.03***	−0.20***	0.01	−0.03***	−0.09***	0.04***
		(−5.71)	(−25.29)	(1.09)	(−9.22)	(−13.95)	(5.66)
	US	−0.02***	−0.05***	0.02*	−0.00	−0.05***	0.03***
		(−3.19)	(−5.16)	(1.77)	(−1.20)	(−5.32)	(3.52)
	Non-US	−0.04***	−0.28***	0.03***	−0.07***	−0.14***	0.08***
		(−6.07)	(−25.97)	(2.68)	(−15.94)	(−15.63)	(8.55)
S	All	−0.03***	−0.20***	0.04***	−0.03***	−0.10***	0.03***
		(−6.58)	(−25.25)	(5.33)	(−11.04)	(−14.15)	(4.63)
	US	−0.01**	−0.05***	0.02**	−0.01**	−0.05***	0.01
		(−1.99)	(−5.10)	(2.30)	(−2.48)	(−5.43)	(0.70)
	Non-US	−0.03***	−0.28***	0.04***	−0.06***	−0.14***	0.07***
		(−5.81)	(−25.92)	(3.61)	(−14.52)	(−15.47)	(7.70)
G	All	−0.02***	−0.20***	0.05***	−0.01***	−0.09***	0.03***
		(−6.10)	(−25.14)	(6.05)	(−5.54)	(−13.7)	(4.71)
	US	−0.01***	−0.05***	0.05***	−0.01***	−0.05***	0.03***
		(−3.69)	(−5.12)	(4.31)	(−2.94)	(−5.43)	(2.62)
	Non-US	−0.02***	−0.28***	0.05***	−0.02***	−0.13***	0.04***
		(−4.93)	(−25.78)	(4.65)	(−5.73)	(−14.41)	(4.28)

Note. The table presents the estimates of main focused coefficients in the firm fixed-effect panel regression (4) of daily stock excess returns on standardized ESG ratings (total ESG and E, S, G pillar scores), daily unexpected changes in global sustainability attention (UGA), and the interaction (ESG×UGA). Values in the parentheses indicate the Newey-West adjusted t-statistic. ***, **, and * indicate the significant level of 1 %, 5 %, and 10 %.

While the correlation between ESG scores and stock returns is weak, there is still evidence of underperformance of high ESG portfolios compared to low ESG portfolios in specific periods, indicating a potential trade-off between return and sustainability. Nevertheless, stocks with good ESG performance can be advantageous and may outperform their counterparts when global sustainability attention intensifies, highlighting the time-varying nature of the ESG-return relationship.

Our findings align with Edmans (2023), supporting the argument that markets already incorporate sustainability in pricing. Additionally, the results extend the findings of Ardia et al. (2022) and Pástor et al. (2022) to the more general investments based on ESG ratings. The study is relevant and essential for researchers and investors focusing on portfolio allocation augmented with ESG information.

CRediT authorship contribution statement

Thanh Nam Vu: Writing – review & editing, Writing – original draft, Visualization, Software, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Heikki Lehkonen:** Writing – review & editing, Validation, Supervision, Resources, Conceptualization. **Juha-Pekka Junttila:** Writing – review & editing, Validation, Supervision, Project administration, Conceptualization. **Brian Lucey:** Writing – review & editing, Validation, Supervision, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The authors do not have permission to share data.

Acknowledgment

We thank editor Donald Lien and two anonymous referees for their comments and suggestions. We would also like to thank the participants of the CINSC2024 ICMA conference in Reading for the comments. Vu thanks the OP Research Foundation [grant numbers 20210056, 20220058, and 20230027] for the financial support.

Appendix

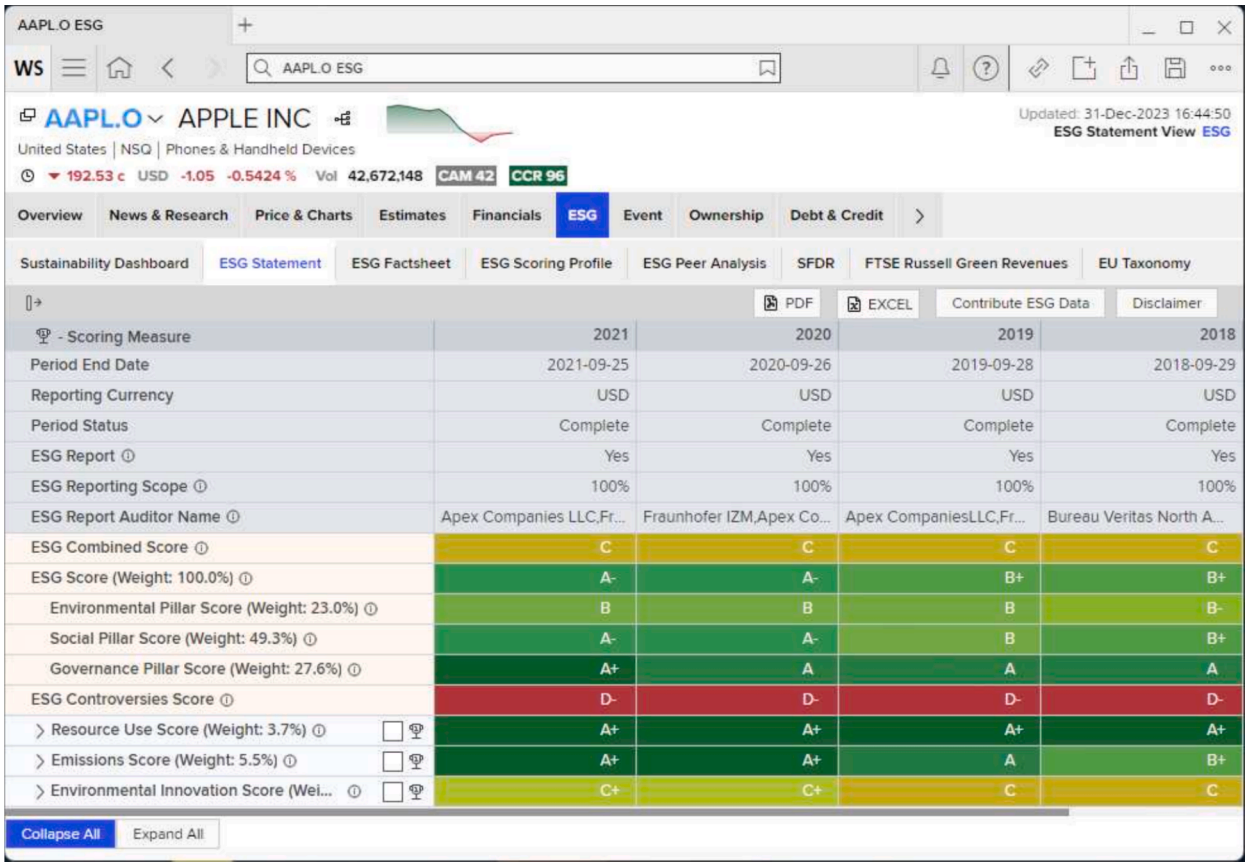

Fig. A1. ESG ratings in LSEG Workspace

Table A1
ESG premium and global attention – Alternative models.

		FF3		FF5		q[5]		Mispricing factors	
		Alpha	UGA	Alpha	UGA	Alpha	UGA	Alpha	UGA
ESG	All	−0.01	0.04	−0.01	0.02	−0.01	0.02	−0.01	0.03
		(-1.23)	(0.98)	(-1.38)	(0.45)	(-1.17)	(0.51)	(-1.25)	(0.77)
	US	−0.03**	0.08*	−0.03**	0.04	−0.03**	0.04	−0.03**	0.05
		(-2.25)	(1.84)	(-2.48)	(1.09)	(-2.32)	(1.08)	(-2.55)	(1.44)
	Non-US	−0.02	0.04	−0.02	0.03	−0.02	0.03	−0.02	0.04
		(-1.32)	(0.75)	(-1.33)	(0.69)	(-1.25)	(0.64)	(-1.28)	(0.83)
E	All	−0.02	0.04	−0.02	0.02	−0.02	0.02	−0.02	0.04
		(-1.40)	(0.90)	(-1.54)	(0.56)	(-1.38)	(0.48)	(-1.33)	(0.82)
	US	−0.02*	0.07*	−0.02**	0.03	−0.02*	0.02	−0.02*	0.05
		(-1.78)	(1.72)	(-2.05)	(1.00)	(-1.87)	(0.62)	(-1.82)	(1.33)
	Non-US	−0.03*	0.05	−0.03*	0.04	−0.02*	0.04	−0.03*	0.05
		(-1.89)	(0.84)	(-1.90)	(0.67)	(-1.72)	(0.72)	(-1.78)	(0.91)
S	All	−0.01	0.02	−0.01	0.01	−0.01	0.01	−0.01	0.02
		(-0.99)	(0.49)	(-1.04)	(0.26)	(-1.22)	(0.21)	(-1.01)	(0.47)
	US	−0.01	0.05	−0.01	0.04	−0.02*	0.03	−0.01	0.04
		(-1.37)	(1.36)	(-1.41)	(1.12)	(-1.68)	(0.88)	(-1.42)	(1.19)
	Non-US	−0.02	0.05	−0.02	0.05	−0.02	0.05	−0.02	0.06

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Table A1 (*continued*)

		FF3		FF5		q^5		Mispricing factors	
		Alpha	UGA	Alpha	UGA	Alpha	UGA	Alpha	UGA
		(-1.47)	(0.84)	(-1.49)	(0.77)	(-1.39)	(0.76)	(-1.41)	(0.91)
G	All	−0.02***	0.12***	−0.02***	0.10***	−0.02***	0.10***	−0.02***	0.11***
		(-3.02)	(4.15)	(-3.18)	(3.74)	(-3.14)	(3.65)	(-3.00)	(3.84)
	US	−0.04***	0.16***	−0.04***	0.13***	−0.04***	0.12***	−0.04***	0.14***
		(-3.67)	(4.55)	(-3.86)	(4.01)	(-3.77)	(3.68)	(-3.84)	(4.15)
	Non-US	−0.02*	0.08**	−0.02*	0.08**	−0.02*	0.09**	−0.02*	0.09***
		(-1.76)	(2.52)	(-1.75)	(2.47)	(-1.70)	(2.50)	(-1.69)	(2.66)

Note: This table shows the estimated alphas and UGA coefficients from regressions using asset pricing models augmented with UGA for high-low portfolios going long/short in high/low-rated ESG stocks (25 % cut-off), as follows:

– Three-factor Fama-French model (FF3):

$$r_{pt} - r_{ft} = \alpha_p + \beta_p^{UGA} UGA_t + \beta_p RM_t + s_p SMB_t + h_p HML_t + \varepsilon_{pt}$$

– Five-factor Fama-French model (FF5):

$$r_{pt} - r_{ft} = \alpha_p + \beta_p^{UGA} UGA_t + \beta_p RM_t + s_p SMB_t + h_p HML_t + r_p RMW_t + c_p CMA_t + \varepsilon_{pt}$$

– q^5 model (Hou et al., 2021):

$$r_{pt} - r_{ft} = \alpha_p + \beta_p^{UGA} UGA_t + \beta_p RM_t + \beta_p^{ME} RME_t + \beta_p^{IA} RIA_t + \beta_p^{ROE} RROE_t + \beta_p^{EG} REG_t + \varepsilon_{pt}$$

– Stambaugh and Yuan (2017) four-factor model (Mispricing factors):

$$r_{pt} - r_{ft} = \alpha_p + \beta_p^{UGA} UGA_t + \beta_p RM_t + s_p SMB_t + \beta_p^{MGMT} MGMT_t + \beta_p^{PERF} PERF_t + \varepsilon_{pt}$$

where rp – rf is the excess return of portfolio, RM is the market excess returns, SMB is the difference between the returns of portfolios of small and large stocks, HML is the same for high and low book-to-market stocks, RMW is for the stocks with robust and weak profitability, CMA is for low and high investment firm's stocks, MOM refers to the momentum factor, RME is size factor, RIA is investment factor, RROE is return on equity factor, REG is expected growth factor, MGMT is management factor, PERF is performance factor, and εp is error. Data for factors are downloaded from https://jkpfactors.com/ and https://global-q.org/.

Stocks are ranked using ESG ratings (total or pillar scores) in December of the previous year. Portfolio returns are value-weighted. Results are reported for all firms, the US firms, and non-US firms across full sample 2004–2022. Values in the parentheses indicate the Newey-West adjusted t-statistic. ***, **, and * indicate the significant level of 1 %, 5 %, and 10 %.

Table A2

Fama–MacBeth cross-sectional regressions.

		ESG	UGA	ESG×UGA	ESG	UGA	ESG×UGA
		2004–2022			2004–2009		
ESG	All	−0.00	−0.19	0.03	−0.01	−0.13	0.03
		(-0.84)	(-1.29)	(1.41)	(-0.94)	(-0.51)	(0.86)
	US	−0.01**	−0.15	0.04**	−0.01*	−0.36	0.06***
		(-2.25)	(-0.84)	(2.05)	(-1.96)	(-1.08)	(3.96)
	Non-US	−0.01*	−0.26	0.07***	−0.01	−0.00	0.01
		(-1.78)	(-1.64)	(3.13)	(-0.54)	(-0.00)	(0.20)
E	All	−0.01	−0.19	0.03*	−0.01	−0.13	0.02
		(-1.52)	(-1.29)	(1.77)	(-1.40)	(-0.51)	(0.73)
	US	−0.01**	−0.15	0.05*	−0.01*	−0.35	0.05*
		(-2.15)	(-0.81)	(1.77)	(-1.69)	(-1.07)	(1.69)
	Non-US	−0.02***	−0.27*	0.10***	−0.02	−0.01	0.05
		(-2.78)	(-1.74)	(4.06)	(-1.51)	(-0.02)	(1.07)
S	All	−0.00	−0.19	0.02	−0.00	−0.13	−0.03
		(-0.47)	(-1.29)	(0.64)	(-0.09)	(-0.51)	(-0.43)
	US	−0.01	−0.16	0.03	−0.01*	−0.36	0.02
		(-1.60)	(-0.87)	(1.40)	(-1.72)	(-1.08)	(1.31)
	Non-US	−0.01	−0.25	0.05	−0.00	−0.01	0.03
		(-0.99)	(-1.62)	(1.64)	(-0.19)	(-0.02)	(0.44)
G	All	−0.01**	−0.19	0.04***	−0.01	−0.13	0.04

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Table A2 (*continued*)

		ESG	UGA	ESG×UGA	ESG	UGA	ESG×UGA
		2004–2022			2004–2009		
		(-2.20)	(-1.29)	(2.87)	(-1.04)	(-0.51)	(1.43)
	US	−0.01***	−0.16	0.06**	−0.01	−0.36	0.08**
		(-2.83)	(-0.84)	(2.55)	(-1.61)	(-1.08)	(2.28)
	Non-US	−0.01*	−0.25	0.04***	−0.01	−0.00	0.01
		(-1.80)	(-1.59)	(2.97)	(-0.60)	(-0.01)	(0.75)
		2010–2015			2016–2022		
ESG	All	−0.01*	−0.20	0.07**	−0.01	−0.24	0.01
		(-1.67)	(-1.21)	(2.49)	(-0.76)	(-0.80)	(0.10)
	US	−0.02**	−0.04	0.06***	−0.00	−0.08	0.02
		(-2.52)	(-0.21)	(2.70)	(-0.14)	(-0.25)	(0.41)
	Non-US	−0.01	−0.27	0.09**	−0.01	−0.45	0.09***
		(-1.11)	(-1.64)	(2.33)	(-1.56)	(-1.64)	(3.77)
E	All	−0.01	−0.18	0.04**	−0.00	−0.24	0.03
		(-1.34)	(-1.21)	(2.44)	(-0.31)	(-0.80)	(0.87)
	US	−0.02**	−0.04	0.05**	−0.01	−0.08	0.03
		(-2.22)	(-0.19)	(2.34)	(-0.43)	(-0.22)	(0.60)
	Non-US	−0.01	−0.28*	0.09**	−0.03***	−0.47*	0.14***
		(-0.82)	(-1.69)	(2.23)	(-2.66)	(-1.75)	(4.43)
S	All	−0.02	−0.19	0.09**	−0.01	−0.24	0.00
		(-1.57)	(-1.21)	(2.14)	(-0.71)	(-0.80)	(0.08)
	US	−0.02**	−0.05	0.06***	−0.00	−0.09	0.01
		(-2.61)	(-0.26)	(2.65)	(-0.09)	(-0.26)	(0.20)
	Non-US	−0.01	−0.27	0.09*	−0.01	−0.44	0.08***
		(-0.83)	(-1.57)	(1.80)	(-1.25)	(-1.61)	(2.65)
G	All	−0.02***	−0.19	0.05***	−0.00	−0.24	0.04
		(-3.89)	(-1.21)	(3.97)	(-0.27)	(-0.80)	(1.21)
	US	−0.02***	−0.05	0.06***	−0.01	−0.08	0.05**
		(-2.98)	(-0.24)	(2.97)	(-0.97)	(-0.24)	(2.15)
	Non-US	−0.01***	−0.27	0.05***	−0.00	−0.43	0.05
		(-2.81)	(-1.60)	(2.74)	(-0.48)	(-1.57)	(0.89)

Note: This table shows time-series averages of the estimated coefficients from the Fama and MacBeth's (1973) two-step regression procedure of daily stock returns on the ESG scores, UGA, and the interaction ESG×UGA; obtained from the following cross-sectional regression:
$ER_{it} = \delta_0 + \delta_{ESG}ESG_{i,y\text{-}1} + \delta_{UGA}UGA_{it} + \delta_{1t}\,ESG_{i,y\text{-}1} \times UGA_t + \gamma_{jt}B_{ji} + \varepsilon_{it}$.
where ER_i is daily excess return of stock i; ESG is the LSEG ESG/E/S/G scores at the end of previous year; UGA is the daily unexpected changes in global attention to sustainability; B_{ji} is estimated factor loading j of stock i from the six-factor model (2) by using observations over prior 60 days [t-70, t-11]. The regressions for each month across firms are carried out using daily observations. The means and standard errors of the time series estimates are calculated by using Newey-West standard errors. Value in parentheses is t-statistics. ***, **, and * indicate the significant level of 1 %, 5 %, and 10 % respectively.

References

Apergis, N., Poufinas, T., & Antonopoulos, A. (2022). ESG scores and cost of debt. *Energy Economics, 112*, Article 106186. https://doi.org/10.1016/j.eneco.2022.106186

Ardia, D., Bluteau, K., Boudt, K., and Inghelbrecht, K. (2022). Climate Change Concerns and the Performance of Green vs. Brown Stocks. *Management Science*, mnsc.2022.4636. https://doi.org/10.1287/mnsc.2022.4636.

Badía, G., Cortez, M. C., & Ferruz, L. (2020). Socially responsible investing worldwide: Do markets value corporate social responsibility? *Corporate Social Responsibility and Environmental Management, 27*(6), 2751–2764. https://doi.org/10.1002/csr.1999

Bahadori, N., Kaymak, T., & Seraj, M. (2021). Environmental, social, and governance factors in emerging markets: The impact on firm performance. *Business Strategy and Development, 4*(4), 411–422. https://doi.org/10.1002/bsd2.167

Bang, J., Ryu, D., & Webb, R. I. (2023). ESG controversy as a potential asset-pricing factor. *Finance Research Letters*. , Article 104315. https://doi.org/10.1016/j.frl.2023.104315

Bansal, R., Wu, D. (Andrew), & Yaron, A. (2022). Socially responsible investing in good and bad times. *The Review of Financial Studies, 35*(4), 2067–2099. https://doi.org/10.1093/rfs/hhab072

Berg, F., Kölbel, J. F., & Rigobon, R. (2022). Aggregate confusion: The divergence of ESG ratings. *Review of Finance, 26*(6), 1315–1344. https://doi.org/10.1093/rof/rfac033

Bolton, P., & Kacperczyk, M. (2021). Do investors care about carbon risk? *Journal of Financial Economics, 142*(2), 517–549. https://doi.org/10.1016/j.jfineco.2021.05.008
Chava, S. (2014). Environmental externalities and cost of capital. *Management Science, 60*(9), 2223–2247. https://doi.org/10.1287/mnsc.2013.1863
Eccles, R. G., Ioannou, I., & Serafeim, G. (2014). The impact of corporate sustainability on organizational processes and performance. *Management Science, 60*(11), 2835–2857. https://doi.org/10.1287/mnsc.2014.1984
Edmans, A. (2011). Does the stock market fully value intangibles? Employee satisfaction and equity prices. *Journal of Financial Economics, 101*(3), 621–640. https://doi.org/10.1016/j.jfineco.2011.03.021
Edmans, A. (2023). Applying economics—Not gut feel—To ESG. *Financial Analysts Journal, 79*(4), 16–29. https://doi.org/10.1080/0015198X.2023.2242758
El Ouadghiri, I., Guesmi, K., Peillex, J., & Ziegler, A. (2021). Public attention to environmental issues and stock market returns. *Ecological Economics, 180*, Article 106836. https://doi.org/10.1016/j.ecolecon.2020.106836
Fama, E. F., & French, K. R. (2018). Choosing factors. *Journal of Financial Economics, 128*(2), 234–252. https://doi.org/10.1016/j.jfineco.2018.02.012
Fama, E. F., & MacBeth, J. D. (1973). Risk, return, and equilibrium: Empirical tests. *Journal of Political Economy, 81*(3), 607–636. https://doi.org/10.1086/260061
Flammer, C. (2015). Does corporate social responsibility lead to superior financial performance? A regression discontinuity approach. *Management Science, 61*(11), 2549–2568. https://doi.org/10.1287/mnsc.2014.2038
Friede, G., Busch, T., & Bassen, A. (2015). ESG and financial performance: Aggregated evidence from more than 2000 empirical studies. *Journal of Sustainable Finance and Investment, 5*(4), 210–233. https://doi.org/10.1080/20430795.2015.1118917
Giese, G., Lee, L.-E., Melas, D., Nagy, Z., & Nishikawa, L. (2019). Foundations of ESG investing: How ESG affects equity valuation, risk, and performance. *The Journal of Portfolio Management, 45*(5), 69–83. https://doi.org/10.3905/jpm.2019.45.5.069
Giglio, S., Kelly, B., & Stroebel, J. (2021). Climate finance. *Annual Review of Financial Economics, 13*(1), 15–36. https://doi.org/10.1146/annurev-financial-102620-103311
Gillan, S. L., Koch, A., & Starks, L. T. (2021). Firms and social responsibility: A review of ESG and CSR research in corporate finance. *Journal of Corporate Finance, 66*, Article 101889. https://doi.org/10.1016/j.jcorpfin.2021.101889
Grewal, J., Riedl, E. J., & Serafeim, G. (2019). Market reaction to mandatory nonfinancial disclosure. *Management Science, 65*(7), 3061–3084. https://doi.org/10.1287/mnsc.2018.3099
Grobys, K., & Kolari, J. W. (2022). Choosing factors: The international evidence. *Applied Economics, 54*(6), 633–647. https://doi.org/10.1080/00036846.2021.1967865
Halbritter, G., & Dorfleitner, G. (2015). The wages of social responsibility — where are they? A critical review of ESG investing. *Review of Financial Economics, 26*(1), 25–35. https://doi.org/10.1016/j.rfe.2015.03.004
Hales, J. (2023). Everything changes: A look at sustainable investing and disclosure over time and a discussion of "Institutional investors, climate disclosure, and carbon emissions". *Journal of Accounting and Economics, 76*(2–3), Article 101645. https://doi.org/10.1016/j.jacceco.2023.101645
Harvey, C. R., Liu, Y., & Zhu, H. (2016). … and the cross-section of expected returns. *Review of Financial Studies, 29*(1), 5–68. https://doi.org/10.1093/rfs/hhv059
Hong, H., & Kacperczyk, M. (2009). The price of sin: The effects of social norms on markets. *Journal of Financial Economics*. https://doi.org/10.1016/j.jfineco.2008.09.001
Hornuf, L., & Yüksel, G. (2023). The performance of socially responsible investments: A meta-analysis. *European Financial Management*. https://doi.org/10.1111/eufm.12439. eufm.12439.
Hou, K., Mo, H., Xue, C., & Zhang, L. (2021). An augmented q-factor model with expected growth. *Review of Finance, 25*(1), 1–41. https://doi.org/10.1093/rof/rfaa004
Kempf, A., & Osthoff, P. (2007). The effect of socially responsible investing on portfolio performance. *European Financial Management, 13*(5), 908–922. https://doi.org/10.1111/j.1468-036X.2007.00402.x
Krüger, P. (2015). Corporate goodness and shareholder wealth. *Journal of Financial Economics, 115*(2), 304–329. https://doi.org/10.1016/j.jfineco.2014.09.008
Lins, K. V., Servaes, H., & Tamayo, A. (2017). Social capital, trust, and firm performance: The value of corporate social responsibility during the financial crisis: Social capital, trust, and firm performance. *The Journal of Finance, 72*(4), 1785–1824. https://doi.org/10.1111/jofi.12505
Lioui, A., & Tarelli, A. (2022). Chasing the ESG factor. *Journal of Banking and Finance, 139*, Article 106498. https://doi.org/10.1016/j.jbankfin.2022.106498
Long, H., Chiah, M., Cakici, N., Zaremba, A., & Bilgin, M. H. (2024). ESG investing in good and bad times: An international study. *Journal of International Financial Markets, Institutions and Money, 91*, Article 101916. https://doi.org/10.1016/j.intfin.2023.101916
Lourenço, I. C., Callen, J. L., Branco, M. C., & Curto, J. D. (2014). The value relevance of reputation for sustainability leadership. *Journal of Business Ethics, 119*(1), 17–28. https://doi.org/10.1007/s10551-012-1617-7
Luo, D. (2022). ESG, liquidity, and stock returns. *Journal of International Financial Markets, Institutions and Money, 78*, Article 101526. https://doi.org/10.1016/j.intfin.2022.101526
Newey, W. K., & West, K. D. (1987). A simple, positive semi-definite, heteroskedasticity and autocorrelation consistent covariance matrix. *Econometrica, 55*(3), 703. https://doi.org/10.2307/1913610
Ni, Y., & Sun, Y. (2023). Environmental, social, and governance premium in Chinese stock markets. *Global Finance Journal, 55*, Article 100811. https://doi.org/10.1016/j.gfj.2023.100811
Pástor, Ľ., Stambaugh, R. F., & Taylor, L. A. (2021). Sustainable investing in equilibrium. *Journal of Financial Economics, 142*(2), 550–571. https://doi.org/10.1016/j.jfineco.2020.12.011
Pástor, Ľ., Stambaugh, R. F., & Taylor, L. A. (2022). Dissecting green returns. *Journal of Financial Economics, 146*(2), 403–424. https://doi.org/10.1016/j.jfineco.2022.07.007
Pedersen, L. H., Fitzgibbons, S., & Pomorski, L. (2021). Responsible investing: The ESG-efficient frontier. *Journal of Financial Economics, 142*(2), 572–597. https://doi.org/10.1016/j.jfineco.2020.11.001
Stambaugh, R. F., & Yuan, Y. (2017). Mispricing Factors. *The Review of Financial Studies, 30*(4), 1270–1315. https://doi.org/10.1093/rfs/hhw107
Statman, M., & Glushkov, D. (2009). The wages of social responsibility. *Financial Analysts Journal, 65*(4), 33–46. https://doi.org/10.2469/faj.v65.n4.5
Tzouvanas, P., & Mamatzakis, E. C. (2021). Does it pay to invest in environmental stocks? *International Review of Financial Analysis, 77*, Article 101812. https://doi.org/10.1016/j.irfa.2021.101812
Widyawati, L. (2020). A systematic literature review of socially responsible investment and environmental social governance metrics. *Business Strategy and the Environment, 29*(2), 619–637. https://doi.org/10.1002/bse.2393
Wong, J. B., & Zhang, Q. (2022). Stock market reactions to adverse ESG disclosure via media channels. *The British Accounting Review, 54*(1), Article 101045. https://doi.org/10.1016/j.bar.2021.101045
Wong, W. C., Batten, J. A., Ahmad, A. H., Mohamed-Arshad, S. B., Nordin, S., & Adzis, A. A. (2021). Does ESG certification add firm value? *Finance Research Letters, 39*, Article 101593. https://doi.org/10.1016/j.frl.2020.101593