Pricing Sustainability Risks: ESG Scores and Stock Returns in Emerging Markets

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Abstract

Sustainable investing has become an increasingly important topic with investors seeking ethical investment options and financial gains through risk mitigation. Extensive research exists on how investors incorporate sustainability in U.S. and European markets. In emerging markets, investor responses to sustainability risks are less explored. My research aims to answer whether investors in these markets demand higher risk premia for firms more exposed to ESG risks. Using emerging market data from 2014 to 2023, I examine how ESG, ESGC, and Social Scores affect stock returns through cross-sectional and time-series analyses. The findings indicate that investors demand a premium on stock returns for higher ESG risk exposure during economic crises. Further, profitability moderates the impact of ESG risks in emerging markets. Finally, country- and industry-specific characteristics significantly influence sustainability risk premia. Overall, this study contributes to the understanding that investors price sustainability-related risks in emerging markets.

Keywords: Emerging markets, ESG, ESG scores, financial performance, risk premia, sustainable investments

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Tópico: Avaliação dos riscos de sustentabilidade: Pontuação ESG e rendibilidade das acções nos mercados emergentes

Resumo

O investimento sustentável tornou-se um tema cada vez mais importante para os investidores que procuram opções de investimento ético e ganhos financeiros através da redução do risco. Existe uma investigação alargada sobre a forma como os investidores incorporam a sustentabilidade nos mercados dos EUA e da Europa. Nos mercados emergentes, as reacções dos investidores aos riscos de sustentabilidade são menos exploradas. A minha investigação visa responder se os investidores nestes mercados exigem prémios de risco mais elevados para empresas mais expostas a riscos ESG. Usando dados de mercados emergentes de 2014 a 2023, examino como as pontuações ESG, ESGC e Social afetam os retornos das ações por meio de análises transversais e de séries temporais. Os resultados indicam que os investidores exigem um prémio sobre os retornos das acções para uma maior exposição ao risco ESG durante as crises económicas. Além disso, a rendibilidade modera o impacto dos riscos ESG nos mercados emergentes. Por último, as caraterísticas específicas do país e do sector influenciam significativamente os prémios de risco de sustentabilidade. De um modo geral, este estudo contribui para a compreensão de que os investidores avaliam os riscos relacionados com a sustentabilidade nos mercados emergentes.

Palavras-chave: mercados emergentes, ESG, pontuações ESG, desempenho financeiro, prémios de risco, investimentos sustentáveis

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List of Abbreviations

Adj.	Adjusted
CSR	Corporate Social Responsibility
EMs	Emerging Markets
ESG	Environmental, Social, and Governance
ESGC	Environmental, Social, and Governance Combined
EU	European Union
FE	Fixed Effects
FF	Fama-French
FRED	Federal Reserve Economic Data
ICB	Industry Classification Benchmark
IMF	International Monetary Fund
S score	Social Pillar Score
U.S.	United States

1. Introduction

Sustainability investing has experienced substantial growth in recent years, driven by increasing awareness of corporate social responsibility (CSR) and its relevance to financial performance[1]. Investors are increasingly drawn to more sustainable investments not just for ethical reasons or client demand, but for the potential long-term benefits, such as risk mitigation and value creation[2]. At first glance, sustainable investing seems like a win-win: improving the world while delivering returns. Yet, the question remains: Does corporate sustainability pay off financially? Numerous studies, particularly in the context of U.S. and European markets, have addressed this question, resulting in a spectrum of findings that range from positive to inconclusive or even negative impacts. Sustainability in emerging markets (EMs) is less explored due to comparably limited data availability and higher complexity. The dynamics of sustainable investing may differ significantly in these markets. Analyzing the overall performance trends of the FTSE Emerging Index alongside its ESG-focused counterpart shown in *Figure 1* offers an interesting perspective: Investing in more sustainable firms has not translated into higher returns.

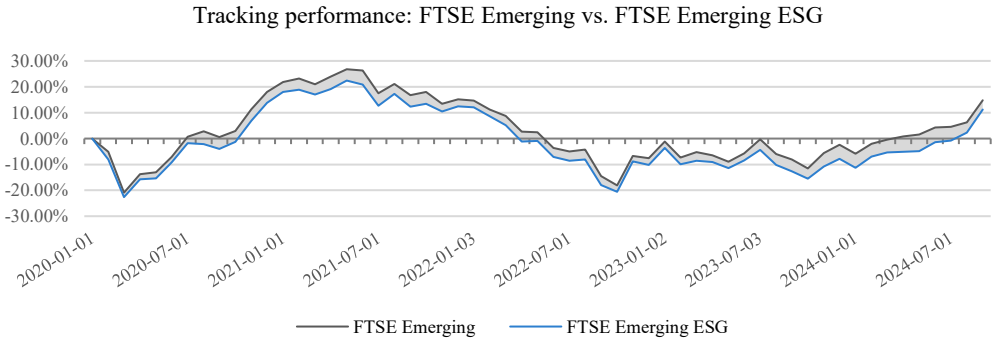

Figure 1: Performance comparison between the FTSE Emerging Index and the FTSE Emerging ESG Low Carbon Select Index

The figure above shows the total monthly returns of the FTSE Emerging Index and the FTSE Emerging ESG Low Carbon Select Index over the period January 2020 - September 2024 retrieved from LSEG Workspace. The grey area marks the difference in returns between the two indices.

[1] For example see Amir & Serafeim (2018), CFA Institute (2020), Tayan (2022), and Principles for Responsible Investment (2024).
[2] For reference see Amir & Serafeim (2018) and Tayan (2022).

My research seeks to better understand how sustainability is priced in EMs. The idea of this thesis is based on a study by Bolton & Kacperczyk (2021). The authors find that investors in U.S. markets treat sustainability performance as a measure of risk exposure. Consequently, investors demand compensation for firms with higher sustainability risks[3] as a premium on stock returns. I aim to investigate whether a similar effect can be observed in EMs, driven by unique challenges including weak regulatory frameworks, fragmented markets, as well as significant economic and social barriers to sustainable development. I find that investors demand higher returns for firms with lower ESG scores, especially during periods of economic uncertainty. However, the pricing of sustainability is characterized by the high fragmentation of EMs, leading to results being strongly impacted by country- and industry-specific factors.

The remainder of this study is organized as follows: Section 2 provides an overview of the existing literature in sustainable finance with a particular focus on EMs. Section 3 outlines the methodology and describes the data sample. Section 4 presents the main results, while Section 5 reports several robustness tests. Section 6 concludes the study by discussing the key findings, limitations, and potential directions for future research.

[3] Please note that throughout this thesis, the terms "sustainability risk" and "ESG risk" are used interchangeably.

2. Literature Review

2.1 Sustainability and Financial Performance: Diverging Evidence

In the past decades, there has been an increasing amount of literature on the effect of sustainability on different measures of firm performance, yet with inconsistent findings. Some research studies argue that operating more sustainably positively affects financial performance. Hartzmark & Sussman (2019) find that funds reported stronger fund inflows after publishing positive sustainability ratings. Lynch & O'Hagan-Luff (2024) report reduced cost of equity as a result of stronger sustainability performance. Ferrell et al. (2016) show a positive relationship between CSR and firm value. However, these positive effects are not universal and often depend on specific conditions, for example on the degree of rating divergence (Avramov et al., 2022), the level of market uncertainty[4] (Lins et al., 2017), and investor awareness (Servaes & Tamayo, 2013).

On the other hand, Lopez-De-Silanes et al. (2020) find that firms with higher ESG scores experience no impact on their financial performance. Better sustainability might even be harmful to stock performance. Dunn et al. (2018) investigate the risk and return implications of international investment strategies that include ESG considerations. They argue that higher exposure to ESG risk increases stock volatility and lowers investor demand. Thus, investors require higher risk compensation for lower sustainability, translating into higher stock returns. Bolton & Kacperczyk (2021) examine the impact of carbon emissions on stock returns in the U.S. stock market. The authors find that firms with higher carbon emissions report significantly higher stock returns implying that investors price in potential risks of more carbon-intensive firms in stock prices.

2.2 The Complexity of ESG Ratings

As demonstrated by the above selection of papers, sustainability is defined and interpreted in several ways. However, ESG ratings seem to be one of the most widely used metrics. A major issue concerning sustainable investing lies in the inconsistency of the underlying ESG rating methodology. As noted above, the potential impact of ESG performance strongly depends on the alignment of ratings and level of investor awareness. This raises an important question: Can discrepancies in ESG ratings threaten investor confidence in sustainable investments?

[4] Which the authors relate to the financial crisis 2008-2009.

The rating industry is fragmented with numerous rating agencies using different methodologies to assess ESG performance (Tayan, 2022). A lack of standardization and consistency leads to substantial disagreements across providers, making it difficult for investors to draw reliable conclusions about a company's sustainability status[5]. In many cases, firms received higher ratings simply by increasing their disclosures without necessarily improving their actual performance (Tayan, 2022). Moreover, the methodology used by rating agencies is not free from bias. Larger companies tend to have better ESG ratings because they can afford to invest in sustainability initiatives, while smaller firms may be penalized even though they operate under different constraints (Dunn et al., 2018). Tayan (2022) further finds evidence of a country bias in favor of European firms over U.S. firms due to the regulatory environment.

2.3 Sustainability Integration in Emerging Markets

EMs present a unique set of challenges and opportunities when it comes to ESG integration. In contrast to developed markets, EMs remain fragmented and heavily reliant on industries like fossil fuels, mining, and agriculture sectors inherently conflicting with ESG principles (Goel et al., 2022). EMs are often more vulnerable to political instability, high interest rates, lack of funding, and government debt, all of which complicate sustainability efforts[6]. Emerging firms tend to underperform their developed market counterparts across all ESG pillars. For instance, G20 nations showed an average ESG score[7] of 64, while firms in EMs scored only 48, reflecting their focus on economic growth over sustainability and underdeveloped government support for climate initiatives (Boston Consulting Group, 2023).

So why do investors continue to seek opportunities in EMs? The answer lies in diversification. EMs are still relatively isolated from other markets and thus exhibit a low but increasing correlation to developed stock markets (Rouwenhorst, 1999). Ghysels et al. (2016) argue that return distributions of emerging firms are more attractive to risk-seeking investors since they are less negatively skewed than the ones of developed firms. Pollard & Sherwood (2018) suggest that

[5] See for example Kotsantonis & Serafeim (2019), Pucker (2021), Berg et al. (2022), Christensen et al. (2022) and Chatterji et al. (2016).
[6] See Amundi Research Center (2024) and World Bank Group (2024).
[7] Following the ESG methodology of LSEG Data & Analytics (2023).

incorporating ESG factors into investment strategies in EMs can lead to higher returns and lower risks. However, EMs currently experience a trade-off situation. ESG efforts are still in their early stages and face significant external challenges associated with high short-term costs in exchange for future long-term benefits (Narula et al., 2024).

Most studies on sustainability are focused on developed markets, especially the U.S. In contrast, I examine how investors respond to ESG risks in EMs. My research explores whether stock returns in EMs reflect sustainability risks, specifically whether investors demand higher returns from firms with weaker ESG scores. Respective risks may, among others, result from exposure to fossil-fuel energy prices, reputational damage, regulatory interventions, and transition risks from the shift to renewable energy sources (Bolton & Kacperczyk, 2021). Referring to the literature above, these factors should be particularly pronounced in EMs. Alternatively, investors in EMs may price ESG risks inefficiently or simply disregard them as they are often not yet part of investment practices.

3. Methodology and Data

3.1 Sample Selection

My methodology closely follows the approach of Bolton & Kacperczyk (2021). The authors conducted several cross-sectional and time-series regressions to assess the impact of carbon emissions on risk premia and stock returns. While their research is concentrated on U.S. stocks, my study specifically focuses on firms in EMs. Since data availability on carbon emissions is low in EMs, I use the ESG, ESGC, and S scores as proxies for a firm's sustainability performance.

The dataset used for my research consists of matched data from LSEG Workspace, the International Monetary Fund (IMF), the Federal Reserve Economic Data (FRED) database, and the Kenneth R. French Data Library. It exclusively covers firms headquartered in EMs from 2014 to 2023. Within LSEG Workspace, the Screener tool was used to filter for relevant primary and public firms within the EMs universe. My definition of EMs is based on the countries covered by the FTSE Emerging Index, specifically focusing on the top ten countries, which represent 92.5% of the index market capitalization. Further, firms were selected based on the main industries represented within the index. The sample encompasses both active and inactive firms to mitigate survivorship bias. Lastly, firms were included if their market capitalization exceeded USD 500 million in any year between 2014 and 2023 ensuring better data availability, which is often positively related to firm size (Bolton & Kacperczyk, 2021).

The preliminary dataset consists of 4,575 firms. To reduce the impact of limited data availability related to ESG reporting, one year with a missing ESG score was interpolated using the previous year's score. Data was only interpolated in cases where one data point between two observations was missing. The dataset was further refined to include only firms with at least three observations for ESG, ESGC, and S scores over the study period. All continuous variables were winsorized to the 1st and 99th percentiles to reduce the effects of extreme outliers. This leaves the final dataset with 1,199 unique firms and 7,541 firm-year observations. *Table 1* displays the number of firm observations by country and industry. Each firm is classified using the ICB framework. The main countries represented in the sample are China, India, and Taiwan with firms mainly operating in the technology, industrial, materials, and financial services sectors.

Table 1: Country and industry representation by number of firms

The following table reports the distribution of firms across countries and industries. All continuous variables are winsorized at the 1% level.

Number of firms by country and industry

	Techn.	Industrials	Materials	Financials	Energy	Utilities	Telecom	Consumer Discr.	Consumer Stapl.	Health Care	Real Estate	Total
China	699	720	620	252	254	205	156	223	9	12	7	3157
India	93	243	158	263	97	94	60	18	3	-	-	1029
Taiwan	534	143	93	119	20	-	61	28	-	-	-	998
South Africa	40	110	143	60	10	-	40	70	-	-	-	473
Brazil	10	44	83	77	36	141	30	39	-	-	-	460
Thailand	23	34	20	106	71	83	23	47	-	-	-	407
Malaysia	26	60	32	83	59	43	43	21	3	-	-	370
Indonesia	4	31	50	59	49	10	47	14	-	-	-	264
Mexico	-	26	61	59	3	-	21	23	-	-	-	193
S. Arabia	-	7	62	69	10	13	24	5	-	-	-	190
Total	1429	1418	1322	1147	609	589	505	488	15	12	7	7541

Tables 2 and *3* report the summary statistics of ESG and ESGC scores over the study period. The number of firms with a respective score tripled from 2014 to 2023, with firms experiencing more pressure to report on sustainability performance (Ali & Wilson, 2024).

Table 2: Summary statistics of ESG scores over time

The following table reports the summary statistics of the ESG scores by year. All continuous variables are winsorized at the 1% level.

Summary statistics: ESG

Year	Mean	Min	Max	p25	Median	p75	SD	N
2014	42.944	3.943	88.857	24.801	44.488	58.876	21.444	386
2015	43.872	4.660	87.201	26.665	42.963	59.131	20.854	398
2016	46.468	5.181	86.358	31.826	47.043	61.818	20.013	414
2017	45.989	3.364	88.993	31.946	47.017	60.544	19.840	478
2018	46.338	4.371	89.755	30.815	47.098	60.613	19.912	571
2019	44.564	3.130	88.811	29.151	43.888	58.834	20.203	752
2020	43.535	6.537	87.242	27.553	42.878	58.063	20.067	945
2021	44.253	7.823	86.744	28.896	43.531	58.772	19.421	1199
2022	47.926	9.859	87.235	32.965	48.472	62.206	18.955	1199
2023	50.812	10.752	87.889	36.914	52.296	64.964	18.731	1199

Table 3: Summary statistics of ESGC scores over time

The following table reports the summary statistics of the ESGC scores by year. All continuous variables are winsorized at the 1% level.

Summary statistics: ESGC

Year	Mean	Min	Max	p25	Median	p75	SD	N
2014	41.793	3.943	88.108	24.801	42.766	56.319	20.793	386
2015	42.903	4.66	87.201	26.005	42.071	57.966	20.427	398
2016	45.646	5.181	86.112	31.698	45.617	60.453	19.625	414
2017	44.781	3.364	86.163	31.422	45.587	59.056	19.213	478
2018	45.772	4.371	89.231	30.063	46.652	60.099	19.722	571
2019	43.694	3.130	87.302	28.672	43.108	57.602	19.654	752
2020	42.808	6.537	86.262	27.440	42.495	56.902	19.509	945
2021	43.707	7.823	85.985	28.851	42.972	58.186	18.988	1199
2022	47.447	9.859	86.115	32.952	47.993	61.286	18.648	1199
2023	49.533	10.752	86.250	36.53	50.617	63.423	18.083	1199

Lower-scoring firms increased their ESG performance over time. However, the relatively constant maximum indicates that firms with higher ESG scores no longer show significant improvements in their ESG performance. ESGC scores show a similar picture. *Appendix 1* further reports the share of firms that were able to increase their ESG score each year, which is around 36% per year on average.

3.2 Variables

This research paper classifies variables into five categories: performance, sustainability, firm-specific, country-specific, and factor variables. *Table 4* provides descriptive statistics of all variables included in the full sample. *Appendix 2* provides a description of these variables as well as relevant sources. *Appendix 3* reports cross-correlations across selected variables.

Table 4: Summary statistics

The following table reports the summary statistics (mean, median, minimum, maximum, 25th percentile, 75th percentile, standard deviation, and standard error of the mean) for the dependent, independent, and control variables used in the course of this paper. All continuous variables are winsorized at the 1% level.

Summary statistics

	Mean	Median	Min	Max	p25	p75	SD	se(Mean)
LogAssets	22.074	21.893	17.152	27.721	20.848	23.138	1.835	0.017
BM	0.730	0.525	0.040	11.180	0.269	0.907	0.797	0.008
Leverage	1.020	0.575	0.000	12.457	0.210	1.256	1.364	0.013
ROE	0.128	0.119	-0.654	0.811	0.066	0.183	0.129	0.001
EPS_G	0.091	0.042	-33.949	19.576	-0.248	0.313	2.236	0.023
Revenue_G	0.136	0.073	-0.960	4.949	-0.044	0.220	0.395	0.004
HHI	0.007	0.002	0.000	0.178	0.001	0.005	0.020	0.000
HPR	0.138	0.017	-0.753	3.673	-0.203	0.323	0.553	0.005
CPI	2.623	2.075	-2.093	9.280	1.437	3.445	1.977	0.018
GDP_G	4.609	5.250	-8.625	9.002	2.787	6.947	3.206	0.029
REER	0.135	0.072	-20.600	16.700	-2.776	2.344	4.739	0.043
Fiscal_D	-5.003	-4.374	-15.479	2.491	-7.071	-2.546	2.983	0.027
MktRF	0.041	0.050	-0.192	0.349	-0.112	0.148	0.158	0.001
SMB	0.003	-0.004	-0.088	0.136	-0.039	0.031	0.065	0.001
HML	0.054	0.042	-0.161	0.243	-0.016	0.158	0.118	0.001
RMW	0.028	0.034	-0.042	0.086	-0.021	0.072	0.046	0.000
CMA	0.021	0.023	-0.074	0.121	-0.058	0.070	0.069	0.001
MOM	0.120	0.100	-0.032	0.278	0.069	0.196	0.093	0.001
ESG	46.123	46.685	3.130	89.755	30.735	60.890	19.836	0.228
ESGC	45.304	45.751	3.130	89.231	30.420	59.499	19.352	0.223
E_Score	43.815	44.006	0.387	95.178	23.894	62.600	24.364	0.288
S_Score	45.360	44.811	0.833	94.348	24.375	65.857	25.270	0.291
G_Score	50.666	51.167	2.854	94.241	33.002	68.556	21.840	0.252

3.2.1 Dependent Variable

I use the annual holding period returns (*HPR*) computed from the year-end closing prices as the dependent variable measuring stock performance. *Figure 2* shows the annual HPRs over the full dataset as well as monthly returns on the FTSE Emerging Index for comparison. During the study period, EMs report considerable variation in returns.

The annual returns of my research sample follow the broader trend of the FTSE Emerging Index, showing similar fluctuations over time, though with noticeable deviations in specific years.

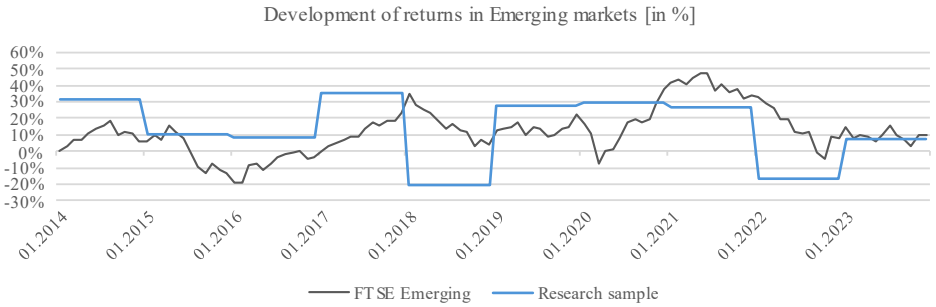

Figure 2: Development of returns in EMs

The figure above shows the annual returns of my research sample plotted against the monthly returns of the FTSE Emerging Index for the period 2014-2023. Returns from my research sample represent average annual HPRs in %, whereas returns from the FTSE Emerging Index show total monthly returns in %.

The research sample shows larger drops in returns around 2018 and 2022, suggesting it might be more sensitive to downturns.

3.2.2 Independent Variables

In my study, sustainability measures serve as independent variables of interest. The ESG score retrieved from LSEG Workspace aggregates the individual pillar scores assigned to three core aspects of ESG, namely Environmental, Social, and Governance. The final metric ranges between 0 and 100, with 100 being a great and 0 being a poor ESG performance. The ESGC score further incorporates a controversies score, which reflects any negative impact on a company's reputation or performance. The ESGC score is computed as the weighted average of the ESG and the controversies score[8]. The latter indicates a score of 0 if a firm has many scandals and 100 for firms with no negative media appearances.

As shown in *Figures 3* and *4*, ESG and ESGC scores exhibited similar upward trends over the past ten years. It seems that while the top-performing firms are maintaining their ESG standards, the

[8] According to LSEG, the controversies score computation accounts for the market capitalization bias of larger firms by severity rates; however, recent controversies might be included in past financial years. Recent controversies are initially included in the scoring for the last completed fiscal year. After the following fiscal year ends, they are reclassified and moved to the 'normal' category, while more recent ones remain classified as 'recent' for the current fiscal year. For reference see LSEG Data & Analytics (2023).

improvement of average ESG and ESGC scores is primarily driven by an upward shift in the lower percentiles. This phenomenon might be explained by the fact that firms tend to experience the greatest benefits when moving from the bottom 20% of low performers with diminishing returns beyond a certain optimal point (Ferrell et al., 2016). Hartzmark & Sussman (2019) further point out that investors are interested in firms with extreme ratings while firms in the middle range are mostly overlooked.

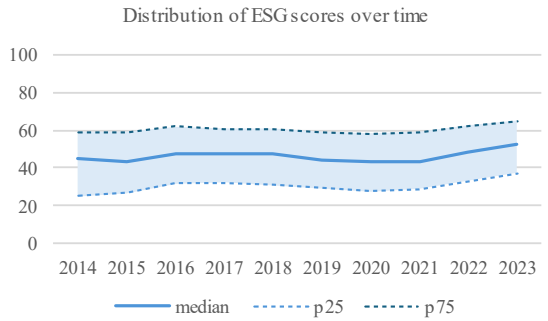

Figure 3: Distribution of ESG scores over time
The figure above shows the distribution of ESG scores over the period of the sample.

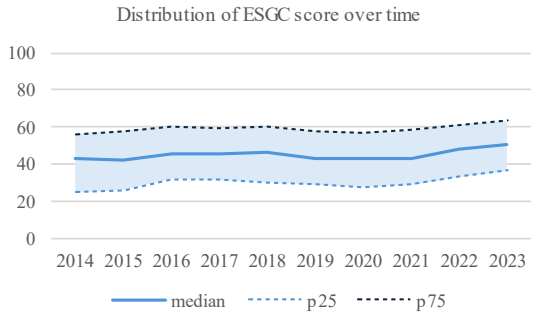

Figure 4: Distribution of ESGC scores over time
The figure above shows the distribution of ESGC scores over the period of the sample.

In addition, I incorporate the Social Pillar Score in my analysis as it is often regarded as the most reliable out of the ESG pillars. Dunn et al. (2018) report that the S score has the strongest correlation to risk. Budsaratragoon & Jitmaneeroj (2021) find that social performance is the main driver of corporate sustainability. Looking at EMs, there is much better disclosure on the S score than the E Score (Goel et al., 2022). In line with these papers, I found the S score to have the highest correlation to the ESG score in my sample (refer to *Appendix 3*).

3.2.2 Control Variables

The control variables used relate to firm-specific as well as country-specific measures. *LogAssets* is the natural logarithm of total assets and is measured in U.S. dollars, representing firm size. *BM* is the book-to-market ratio, calculated as the book value of equity divided by the market value of equity, controlling for value vs. growth characteristics. *Leverage* represents the debt-to-equity ratio and is calculated as the total debt divided by the total equity, reflecting financial risk. *ROE*, the return on equity, is defined as the net income divided by the average book value of the previous and current year's equity and accounts for firm profitability. *EPS_G*, the earnings per share growth,

represents the annual growth rate of earnings per share, signaling growth expectations. *Revenue_G* is the annual growth rate of total business revenues and controls for business expansion and market demand. *HHI* represents the Herfindahl-Hirschman Index based on the revenue distribution across industries. The HHI accounts for industry concentration with higher values indicating less competition within the industry.

CPI is the Consumer Price Index and is used as a measure of inflation, controlling for changes in the general price level that can impact firm costs and consumer purchasing power. *GDP_G* is the annual growth rate of gross domestic product and accounts for the overall economic growth as a stronger economy can drive higher corporate earnings and stock performance. *REER*, is the real effective exchange rate, which is computed as the weighted average of bilateral exchange rates adjusted by relative consumer prices and accounts for the influence of currency changes on firms. *Fiscal_D* is the difference between a government's total revenue and total expenditure, i.e., the net lending/borrowing and is expressed as a percentage of GDP. The fiscal deficit captures a government's fiscal position as larger deficits can affect economic stability, interest rates, and investment conditions.

3.2.3 Factor Variables

Factor variables for EMs were retrieved from the Kenneth R. French Data Library. *MktRF* is the annual market risk premium, calculated as the excess return of the market over the risk-free rate. *SMB* represents the annual return on a portfolio long on small-cap stocks and short on large-cap stocks, representing the size premium. *HML* is the annual return on a portfolio long on value stocks and short on growth stocks, reflecting the value premium. *RMW* is the annual return on a portfolio long on high-profitability stocks and short on low-profitability stocks. *CMA* is the annual return on a portfolio long on conservative and short on aggressive investment stocks, accounting for differences in investment strategies. *MOM,* representing the momentum factor, is the annual return on a portfolio long on stocks with high past returns and short on stocks with low past returns.

3.3 Regression Analyses

My analysis aims to determine whether investors price sustainability risks in EMs, more specifically whether investors demand a sustainability premium for firms with higher exposure to ESG risks. Regressions 1 and 3 assess the impact of ESG, ESGC, and S scores (in the following referred to as sustainability measures) on stock returns in different settings[9]. Regression 2 examines how general risk factors influence this relationship.

3.3.1 Cross-Sectional ESG Impact on Stock Returns

Following Bolton & Kacperczyk (2021), I conduct cross-sectional regressions with firm-specific controls and industry-fixed effects (FE) to analyze the impact of sustainability measures on stock performance. A cross-sectional analysis examines if there is a consistent relationship between a set of variables at specific points in time (Fama & MacBeth, 1973). Robust standard errors are used to address potential heteroscedasticity. Equation (1a) and (1b) are estimated as follows:

$$HPR_{it} = \alpha_t + \beta_{1t} ESG_{it} + \beta_{2t} FirmControls_{it} + \epsilon_{it} \quad \textbf{(1a)}$$

The regression model was further run using industry FE:

$$HPR_{it} = \alpha_t + \beta_{1t} ESG_{it} + \beta_{2t} FirmControls_{it} + IndustryFE + \epsilon_{it} \quad \textbf{(1b)}$$

Regression (1a) and (1b) each result in ten coefficients, one for each year for all three sustainability measures, respectively.

3.3.2 ESG Premium and Risk Factors

The next set of regressions assesses whether the sustainability coefficient is related to the five Fama-French factors and momentum. In line with Bolton & Kacperczyk (2021), I regress the coefficients obtained from the first regression on a set of risk factors including market, size, value, profitability, investment, and momentum. The corresponding factors are based on EM data.

[9] For clarity, all regression equations are shown for the ESG score only, although regressions were conducted for all three sustainability measures.

Regression (2a) and (2b) are presented below. Regression (2a) uses the coefficients obtained from Regression (1a):

$$\beta_{1t} = \alpha_t + \gamma_1 MktRf_t + \gamma_2 SMB_t + \gamma_3 HML_t + \gamma_4 RMW_t + \gamma_5 CMA_t + \gamma_6 MOM_t + \epsilon_t \quad \textbf{(2a)}$$

Regression (2b) uses the coefficients obtained from Regression (1b), i.e., incl. industry FE, and is estimated as follows:

$$\beta(incl.FE)_{1t} = \alpha_t + \gamma_1 MktRf_t + \gamma_2 SMB_t + \gamma_3 HML_t + \gamma_4 RMW_t + \gamma_5 CMA_t + \gamma_6 MOM_t + \epsilon_t \quad \textbf{(2b)}$$

Each regression is conducted twice: first using the five Fama-French factors alone, and then additionally including the momentum factor. The resulting coefficients show whether sustainability measures are related to common risk factors and momentum.

3.3.3 Time-Series Analysis of ESG on Stock Returns

The last regression analysis examines whether a persistent relationship exists between HPRs and sustainability measures over time. I perform a progressive regression by gradually adding firm-specific and country-specific controls to the model. A one-year lag is applied to all independent variables to address potential issues of information availability and investor reaction. Bolton & Kacperczyk (2021) argue that using emissions data from year t to explain stock returns in the same year could introduce a look-ahead bias.

Similarly, ESG scores are usually disclosed on an annual basis. Investors can only access current scores upon publication at year-end, thus stock returns throughout the year may be related to ESG information that was not yet available to the market. By lagging sustainability measures, I ensure that the stock returns are responding to a full year's worth of ESG information that investors could realistically have taken into consideration[10]. Robust standard errors are used to address potential heteroscedasticity. Lastly, I include industry and year FE to control for unobserved factors.

[10] This follows the methodology of Bolton & Kacperczyk (2021).

The progressive Regression (3) is estimated as follows:

$$HPR_{it} = \alpha_t + \beta_{1t} ESG_{i(t-1)} + \beta_{2t} FirmControls_{i(t-1)} + \beta_{3t} CountryControls_{i(t-1)} + IndustryFE + TimeFE + \epsilon_{it} \quad \textbf{(3)}$$

The progressive approach gradually includes control variables, helping to isolate the impact of sustainability measures on HPRs from other firm-level and macroeconomic factors.

4. Results

The following section presents the results of the cross-sectional, risk factor-based, and time-series regressions. In general, a negative coefficient on the ESG score would imply higher stock returns for firms with lower ESG performance. This would show that investors demand compensation for firms in EMs that are more prone to sustainability risks such as regulatory penalties or reputational damage. A negative coefficient would align with the findings of Bolton & Kacperczyk (2021) for the U.S. market. In contrast, a positive ESG coefficient suggests that firms with lower ESG scores report lower stock returns, i.e., no compensation is demanded for sustainability risks. Instead, firms with better ESG scores would achieve higher returns. Thus, ESG risks would not be reflected as premia on stock returns.

4.1 Cross-Sectional Results

Results from Regression (1a) and (1b) are reported in *Tables 5, 6* and *7*. The sign of the ESG coefficient varies throughout the years. Specifically, 2014, 2015, and 2021 exhibit negative and statistically significant coefficients. Conversely, 2016 and 2018 show a positive and significant relationship between ESG score and HPR (models 3 and 5). Including industry FE, the adjusted R-squared values range from 12.2% to 37.8% (*Table 5B*), indicating moderate explanatory power. This effect is consistent across all three sustainability metrics and holds when including industry FE. The S score exhibits the highest number of significant coefficients.

The results suggest the presence of a sustainability premium during periods of economic crisis. The oil price collapse from mid-2014 to early 2016 led to a severe downturn in more than 70% of oil-exporting emerging economies. They experienced a strong decrease in revenues, as well as a decline in consumption and investments (World Bank Group, 2018). Oil-importing EMs suffered from a limited transfer of global price declines to domestic markets and diminished returns from newly established oil production facilities. At the same time, EMs were affected by political and economic instability. Brazil entered a deep recession in 2014 with a decline in real GDP of 3% and inflation close to 10% (European Central Bank, 2016). The outbreak of the COVID-19 pandemic triggered a global economic crisis throughout 2020 and 2021 that disproportionally hit EMs (World Bank Group, 2022).

Table 5: ESG score and stock performance by year

The table below presents the results of Regressions 1a and 1b for the ESG score. The sample period is 2014-2023. All variables are defined in *Appendix 2*. Panel A reports the results for the ESG score controlling for company-specific variables. Panel B reports the results for the ESG score controlling for company-specific variables as well as industry FE. All continuous variables are winsorized at the 1% level. Standard errors are robust. *, **, *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: ESG score and stock performance

VARIABLES	(1) 2014	(2) 2015	(3) 2016	(4) 2017	(5) 2018	(6) 2019	(7) 2020	(8) 2021	(9) 2022	(10) 2023
ESG	-0.004***	-0.003***	0.007***	0.001	0.002***	-0.000	-0.001	-0.002**	0.000	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)
Observations	319	338	353	405	474	622	768	953	991	956
R-squared	0.247	0.352	0.200	0.141	0.114	0.347	0.367	0.205	0.143	0.094
Adj R-squared	0.227	0.336	0.181	0.123	0.099	0.338	0.360	0.198	0.136	0.086
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry FE	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Panel B: ESG score and stock performance incl. industry FE

VARIABLES	(1) 2014	(2) 2015	(3) 2016	(4) 2017	(5) 2018	(6) 2019	(7) 2020	(8) 2021	(9) 2022	(10) 2023
ESG	-0.003***	-0.002***	0.006***	0.001	0.002***	-0.000	-0.001	-0.002*	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)
Observations	319	338	353	405	474	622	768	953	991	956
R-squared	0.287	0.380	0.316	0.160	0.187	0.380	0.392	0.227	0.256	0.139
Adj. R-squared	0.251	0.351	0.286	0.126	0.158	0.362	0.378	0.212	0.242	0.122
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

During an economic crisis with high market uncertainty, investors seem to demand higher returns as compensation for ESG risks, viewing weaker sustainability as an added vulnerability. After the crisis, the urgency to compensate for these risks may decrease as the market stabilizes and risk tolerance increases.

Table 6: ESGC score and stock performance by year

The table below presents the results of Regressions 1a and 1b for the ESGC score. The sample period is 2014-2023. All variables are defined in *Appendix 2*. Panel A reports the results for the ESGC score controlling for company-specific variables. Panel B reports the results for the ESGC score controlling for company-specific variables as well as industry FE. All continuous variables are winsorized at the 1% level. Standard errors are robust. *, **, *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: ESGC score and stock performance

VARIABLES	(1) 2014	(2) 2015	(3) 2016	(4) 2017	(5) 2018	(6) 2019	(7) 2020	(8) 2021	(9) 2022	(10) 2023
ESGC	-0.004***	-0.003***	0.006***	0.001	0.001**	-0.001	-0.001	-0.002**	0.000	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)
Observations	319	338	353	405	474	622	768	953	991	956
R-squared	0.254	0.351	0.190	0.140	0.113	0.347	0.367	0.206	0.143	0.094
Adj. R-squared	0.235	0.335	0.171	0.123	0.0973	0.338	0.360	0.199	0.136	0.0861
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry FE	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Panel B: ESGC score and stock performance incl. industry FE

VARIABLES	(1) 2014	(2) 2015	(3) 2016	(4) 2017	(5) 2018	(6) 2019	(7) 2020	(8) 2021	(9) 2022	(10) 2023
ESGC	-0.004***	-0.002***	0.006***	0.001	0.002***	-0.001	-0.001	-0.002**	0.000	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)
Observations	319	338	353	405	474	622	768	953	991	956
R-squared	0.294	0.377	0.308	0.159	0.184	0.381	0.392	0.228	0.255	0.138
Adj. R-squared	0.259	0.348	0.277	0.125	0.155	0.362	0.377	0.213	0.241	0.122
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7: S score and stock performance by year

The table below presents the results of Regressions 1a and 1b for the S score. The sample period is 2014-2023. All variables are defined in *Appendix 2*. Panel A reports the results for the S score controlling for company-specific variables. Panel B reports the results for the S score controlling for company-specific variables as well as industry FE. All continuous variables are winsorized at the 1 % level. Standard errors are robust. *, **, *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: S score and stock performance

VARIABLES	(1) 2014	(2) 2015	(3) 2016	(4) 2017	(5) 2018	(6) 2019	(7) 2020	(8) 2021	(9) 2022	(10) 2023
S_Score	-0.003***	-0.002***	0.006***	0.001	0.001***	-0.000	-0.001*	-0.002***	0.001**	0.002***
	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)
Observations	319	338	353	405	474	622	768	953	991	956
R-squared	0.245	0.349	0.206	0.141	0.117	0.347	0.368	0.208	0.147	0.103
Adj. R-squared	0.225	0.333	0.187	0.123	0.102	0.339	0.362	0.201	0.140	0.096
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry FE	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Panel B: S score and stock performance incl. industry FE

VARIABLES	(1) 2014	(2) 2015	(3) 2016	(4) 2017	(5) 2018	(6) 2019	(7) 2020	(8) 2021	(9) 2022	(10) 2023
S_Score	-0.002***	-0.002***	0.005***	0.001	0.001***	-0.001	-0.001	-0.002**	0.001***	0.002***
	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)
Observations	319	338	353	405	474	622	768	953	991	956
R-squared	0.284	0.376	0.323	0.160	0.185	0.381	0.393	0.229	0.261	0.146
Adj. R-squared	0.248	0.347	0.292	0.126	0.157	0.363	0.378	0.214	0.247	0.130
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

4.2 Risk Factor Attribution

In contrast to Bolton & Kacperczyk (2021), I do not find evidence of a sustainability premium in EMs, which is independent of other common risk factors. Bolton & Kacperczyk (2021) demonstrate that in the U.S., risk factors reduce the size of the sustainability premium by 10-20%, but they do not fully explain it.

In my results, reported in *Table 8*, I find no significant constant that indicates a persistent average sustainability premium once common risk factors are included. However, I observe a negative and statistically significant coefficient for the RMW factor, regardless of whether industry FE are included. The negative effect of the RMW factor holds across all sustainability measures. In addition, there are no significant coefficients for the other Fama-French factors. This suggests that in EMs, for firms with higher profitability (i.e., more robust firms) the effect of ESG decreases. The underlying reason might be that EMs are characterized by higher levels of volatility and risk compared to developed markets. Profitability and financial stability might play a more critical role than sustainability in influencing returns. In EMs, as firms demonstrate higher profitability, the importance of ESG factors may diminish in the eyes of investors, who may instead prioritize financial performance.

For robustness, I add momentum to the regression. The MOM factor does not significantly impact the coefficients but improves the adjusted R-squared. The overall adjusted R-squared lies over 60.4% in all cases and ranges up to 82.9% (*Table 8B*). The model's high explanatory power could stem from two main factors. First, the sample size for the regression is limited to just ten observations, allowing the model to achieve higher R-squared values more easily due to fewer degrees of freedom. Second, the risk factors likely capture return variations linked to financial characteristics that overlap with sustainability measures, suggesting that the financial risk exposures associated with sustainability align closely with traditional factor models.

Table 8: Sustainability premia and risk factors

The table below presents the results of Regressions 2a and 2b. The sample period is 2014-2023. The dependent variables are the coefficients estimated in each period using the cross-sectional return regression (1a and 1b). All variables are defined in *Appendix 2*. Panel A reports the results for the regression of betas on MktRF, SMB. HML, RMW, and CMA. Panel B reports the results for the regression of betas on MktRF, SMB. HML, RMW and CMA plus MOM. Models (1), (3), and (5) use the betas obtained from Regression 1a. Models (2), (4), and (6) use the betas obtained from Regression 1b incl. industry FE. All continuous variables are winsorized at the 1% level. *, **, *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Sustainability premia on 5FF

	ESG	ESG	ESGC	ESGC	S_Score	S_Score
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	beta	beta_FE	beta	beta_FE	beta	beta_FE
MktRF	0.003	0.003	0.002	0.003	0.000	0.002
	(0.007)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
SMB	-0.019	-0.019	-0.017	-0.017	-0.016	-0.015
	(0.010)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
HML	0.022	0.018	0.023	0.019	0.022	0.017
	(0.013)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
RMW	-0.036*	-0.032*	-0.039**	-0.035**	-0.030*	-0.027*
	(0.013)	(0.013)	(0.013)	(0.012)	(0.013)	(0.012)
CMA	-0.018	-0.009	-0.022	-0.013	-0.022	-0.010
	(0.030)	(0.028)	(0.028)	(0.027)	(0.028)	(0.027)
Constant	0.000	0.000	0.000	0.000	0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Observations	10	10	10	10	10	10
R-squared	0.859	0.854	0.872	0.863	0.837	0.824
Adj. R-squared	0.682	0.672	0.711	0.692	0.633	0.604

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Panel B: Sustainability premia on 5FF + MOM

	ESG	ESG	ESGC	ESGC	S_Score	S_Score
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	beta	beta_FE	beta	beta_FE	beta	beta_FE
MktRF	0.011	0.011	0.009	0.009	0.007	0.008
	(0.006)	(0.006)	(0.007)	(0.006)	(0.007)	(0.006)
SMB	-0.011	-0.012	-0.010	-0.010	-0.010	-0.009
	(0.008)	(0.008)	(0.009)	(0.008)	(0.009)	(0.008)
HML	0.013	0.009	0.016	0.011	0.015	0.010
	(0.010)	(0.010)	(0.011)	(0.010)	(0.011)	(0.011)
RMW	-0.033**	-0.029*	-0.037**	-0.033**	-0.027*	-0.025*
	(0.010)	(0.009)	(0.011)	(0.010)	(0.011)	(0.010)
CMA	-0.005	0.003	-0.011	-0.002	-0.010	0.000
	(0.023)	(0.021)	(0.024)	(0.023)	(0.024)	(0.023)
MOM	-0.014	-0.013	-0.012	-0.011	-0.012	-0.011
	(0.007)	(0.006)	(0.007)	(0.007)	(0.007)	(0.007)
Constant	0.002	0.002	0.001	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Observations	10	10	10	10	10	10
R-squared	0.943	0.941	0.934	0.931	0.914	0.906
Adj. R-squared	0.829	0.824	0.802	0.792	0.743	0.719

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

4.3 Time-Series Results

Tables 9, 10, and *11* report the results of Regression 3. I find a positive and significant coefficient of the ESG score on HPRs of 0.002-0.003. There are two specifications where I find negative coefficients. In specification (1), the negative effect of ESG is due to the lack of controls and FE, representing an incomplete model. When including year FE in the model (13) the previously observed positive coefficient reverses. This implies that time-varying factors such as macroeconomic trends or changes in investor preferences might have been driving the positive effect. Once these are accounted for, the underlying relationship between ESG scores and returns appears negative. As shown in *Figure 2* of Section 3, HPRs experience large variations over time, which might bias the effect in the previous specifications without year FE. In model (14), the ESG coefficient becomes insignificant, indicating that once both year and industry FE are included, ESG no longer has a statistically significant impact on returns. This highlights the influence of industry-specific factors, reflecting the high degree of fragmentation within EMs. Over all sustainability measures, the adjusted R-squared ranges between 0.3% and 26.8%, increasing with additional controls[11].

In conclusion, the relationship between sustainability measures and returns is affected by large variations in returns over time. However, when accounting for time-varying factors, I find that investors demand premia on returns as compensation for firms exposed to higher sustainability risks.

[11] I do not report the adjusted R-squared in model (14) because the combination of year and industry FE absorbs too much variation, leading to insufficient degrees of freedom for the calculation.

Table 9: ESG score and stock performance over the sample period 2014-2023

The table below presents the results of Regression 3. The sample period is 2014-2023. All independent and control variables are lagged by one period. Control variables and FE are progressively added with each column. All variables are defined in *Appendix 2*. All continuous variables are winsorized at the 1% level. Standard errors are robust. *, **, *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Regression 3: Time series regressions on ESG score

VARIABLES	(1) HPR	(2) HPR	(3) HPR	(4) HPR	(5) HPR	(6) HPR	(7) HPR	(8) HPR	(9) HPR	(10) HPR	(11) HPR	(12) HPR	(13) HPR	(14) HPR
ESG $_{i; t-1}$	-0.003***	0.002***	0.002***	0.002***	0.003***	0.003***	0.003***	0.003***	0.002**	0.002**	0.002**	0.002**	-0.001*	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)
LogAssets $_{i; t-1}$		-0.445***	-0.466***	-0.485***	-0.515***	-0.523***	-0.510***	-0.501***	-0.503***	-0.513***	-0.510***	-0.515***	-0.523***	-0.016***
		(0.046)	(0.039)	(0.039)	(0.043)	(0.045)	(0.046)	(0.046)	(0.045)	(0.045)	(0.045)	(0.045)	(0.046)	(0.006)
BM $_{i; t-1}$			0.196***	0.192***	0.179***	0.179***	0.177***	0.178***	0.166***	0.155***	0.154***	0.154***	0.152***	0.046***
			(0.024)	(0.024)	(0.029)	(0.031)	(0.031)	(0.031)	(0.031)	(0.030)	(0.030)	(0.030)	(0.031)	(0.013)
Leverage $_{i; t-1}$				0.041**	0.043***	0.038**	0.039**	0.038**	0.037**	0.035**	0.034**	0.035**	0.030**	-0.002
				(0.017)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.015)	(0.005)
ROE $_{i; t-1}$					-0.412***	-0.422***	-0.362***	-0.358***	-0.402***	-0.349***	-0.356***	-0.353***	-0.332***	-0.014
					(0.106)	(0.113)	(0.115)	(0.115)	(0.111)	(0.111)	(0.110)	(0.110)	(0.110)	(0.067)
EPS_G $_{i; t-1}$						0.001	0.003	0.003	0.003	0.002	0.002	0.002	0.004	0.004
						(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Rev_G $_{i; t-1}$							-0.085***	-0.080***	-0.094***	-0.046*	-0.042	-0.042	-0.024	-0.025
							(0.028)	(0.028)	(0.028)	(0.027)	(0.027)	(0.027)	(0.027)	(0.023)
HHI $_{i; t-1}$								-3.991**	-3.744**	-3.922**	-3.882**	-3.908**	0.488	0.131
								(1.569)	(1.576)	(1.590)	(1.573)	(1.568)	(1.231)	(0.231)
CPI $_{i; t-1}$									0.045***	0.047***	0.048***	0.048***	0.046***	0.035***
									(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.003)
GDP_G $_{i; t-1}$										-0.023***	-0.022***	-0.020***	-0.001	0.004
										(0.002)	(0.002)	(0.003)	(0.003)	(0.002)
REER $_{i; t-1}$											-0.002	-0.002	-0.001	-0.001
											(0.001)	(0.001)	(0.001)	(0.001)
Fisc_Def $_{i; t-1}$												-0.004	-0.001	0.004*
												(0.004)	(0.004)	(0.002)
Constant	0.209***	10.039***	10.383***	10.781***	11.521***	11.736***	11.445***	11.294***	11.234***	11.560***	11.487***	11.575***	11.375***	-0.011
	(0.029)	(1.033)	(0.868)	(0.865)	(0.944)	(0.997)	(1.023)	(1.017)	(0.991)	(0.996)	(0.991)	(1.004)	(1.017)	(0.126)
Observations	6,270	6,253	6,194	6,054	5,399	5,239	5,236	5,236	5,236	5,236	5,236	5,236	5,236	5,236
R-squared	0.004	0.054	0.101	0.104	0.121	0.121	0.123	0.124	0.142	0.166	0.166	0.166	0.270	0.200
Adj. R-squared	0.004	0.053	0.101	0.104	0.120	0.120	0.122	0.123	0.140	0.164	0.164	0.164	0.268	-
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO
Year FE	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	YES
Industry FE	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 10: ESGC score and stock performance over the sample period 2014-2023

The table below presents the results of Regression 3. The sample period is 2014-2023. All independent and control variables are lagged by one period. Control variables and FE are progressively added with each column. All variables are defined in *Appendix 2*. All continuous variables are winsorized at the 1% level. Standard errors are robust. *, **, *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Regression 3: Time series regressions on ESGC score

VARIABLES	(1) HPR	(2) HPR	(3) HPR	(4) HPR	(5) HPR	(6) HPR	(7) HPR	(8) HPR	(9) HPR	(10) HPR	(11) HPR	(12) HPR	(13) HPR	(14) HPR
ESGC $_{i; t-1}$	-0.003***	0.002***	0.002***	0.002***	0.003***	0.003***	0.003***	0.003***	0.002***	0.002**	0.002**	0.002**	-0.001*	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)
LogAssets $_{i; t-1}$		-0.442***	-0.465***	-0.483***	-0.511***	-0.518***	-0.505***	-0.497***	-0.499***	-0.511***	-0.508***	-0.514***	-0.525***	-0.016***
		(0.045)	(0.039)	(0.038)	(0.042)	(0.044)	(0.045)	(0.045)	(0.044)	(0.044)	(0.043)	(0.044)	(0.045)	(0.006)
BM $_{i; t-1}$			0.195***	0.191***	0.178***	0.179***	0.177***	0.178***	0.165***	0.154***	0.154***	0.154***	0.152***	0.046***
			(0.024)	(0.024)	(0.029)	(0.031)	(0.031)	(0.031)	(0.031)	(0.030)	(0.030)	(0.030)	(0.031)	(0.013)
Leverage $_{i; t-1}$				0.041**	0.042***	0.038**	0.038**	0.037**	0.036**	0.035**	0.034**	0.034**	0.031**	-0.002
				(0.017)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.015)	(0.005)
ROE $_{i; t-1}$					-0.413***	-0.422***	-0.362***	-0.358***	-0.402***	-0.349***	-0.356***	-0.352***	-0.332***	-0.014
					(0.106)	(0.113)	(0.115)	(0.115)	(0.111)	(0.111)	(0.110)	(0.110)	(0.110)	(0.067)
EPS_G $_{i; t-1}$						0.001	0.003	0.003	0.003	0.002	0.002	0.002	0.004	0.004
						(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Rev_G $_{i; t-1}$							-0.086***	-0.081***	-0.095***	-0.046*	-0.042	-0.042	-0.024	-0.025
							(0.028)	(0.028)	(0.028)	(0.027)	(0.027)	(0.027)	(0.027)	(0.023)
HHI $_{i; t-1}$								-4.054**	-3.797**	-3.957**	-3.916**	-3.939**	0.492	0.131
								(1.586)	(1.590)	(1.604)	(1.587)	(1.581)	(1.229)	(0.231)
CPI $_{i; t-1}$									0.045***	0.047***	0.048***	0.048***	0.046***	0.035***
									(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.003)
GDP_G $_{i; t-1}$										-0.023***	-0.022***	-0.020***	-0.001	0.004
										(0.002)	(0.002)	(0.003)	(0.003)	(0.002)
REER $_{i; t-1}$											-0.002	-0.002	-0.001	-0.001
											(0.001)	(0.001)	(0.001)	(0.001)
Fisc_Def $_{i; t-1}$												-0.004	-0.001	0.004*
												(0.004)	(0.004)	(0.002)
Constant	0.185***	9.993***	10.349***	10.730***	11.440***	11.628***	11.347***	11.208***	11.159***	11.526***	11.455***	11.553***	11.425***	-0.010
	(0.028)	(1.012)	(0.852)	(0.849)	(0.924)	(0.974)	(0.998)	(0.994)	(0.968)	(0.972)	(0.967)	(0.982)	(1.012)	(0.125)
Observations	6,270	6,253	6,194	6,054	5,399	5,239	5,236	5,236	5,236	5,236	5,236	5,236	5,236	5,236
R-squared	0.003	0.054	0.101	0.105	0.121	0.121	0.123	0.124	0.142	0.166	0.166	0.166	0.270	0.200
Adj. R-squared	0.003	0.054	0.101	0.104	0.120	0.120	0.122	0.123	0.140	0.164	0.164	0.164	0.267	-
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO
Year FE	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	YES
Industry FE	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 11: S score and stock performance over the sample period 2014-2023

The table below presents the results of Regression 3. The sample period is 2014-2023. All independent and control variables are lagged by one period. Control variables and FE are progressively added with each column. All variables are defined in *Appendix 2*. All continuous variables are winsorized at the 1% level. Standard errors are robust. *, **, *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Regression 3: Time series regressions on S-score

VARIABLES	(1) HPR	(2) HPR	(3) HPR	(4) HPR	(5) HPR	(6) HPR	(7) HPR	(8) HPR	(9) HPR	(10) HPR	(11) HPR	(12) HPR	(13) HPR	(14) HPR
S_Score $_{i; t-1}$	-0.002***	0.002***	0.002***	0.002***	0.003***	0.003***	0.003***	0.002***	0.002***	0.002***	0.002***	0.002***	-0.001	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)
LogAssets $_{i; t-1}$		-0.447***	-0.473***	-0.491***	-0.519***	-0.529***	-0.516***	-0.507***	-0.510***	-0.520***	-0.517***	-0.523***	-0.525***	-0.014**
		(0.046)	(0.039)	(0.039)	(0.041)	(0.044)	(0.045)	(0.045)	(0.044)	(0.044)	(0.043)	(0.044)	(0.046)	(0.006)
BM $_{i; t-1}$			0.196***	0.192***	0.179***	0.180***	0.178***	0.179***	0.166***	0.155***	0.155***	0.154***	0.152***	0.045***
			(0.024)	(0.024)	(0.029)	(0.031)	(0.031)	(0.031)	(0.031)	(0.030)	(0.030)	(0.030)	(0.031)	(0.013)
Leverage $_{i; t-1}$				0.041**	0.042***	0.037**	0.038**	0.037**	0.036**	0.035**	0.034**	0.034**	0.031**	-0.002
				(0.017)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.015)	(0.005)
ROE $_{i; t-1}$					-0.407***	-0.416***	-0.358***	-0.353***	-0.398***	-0.346***	-0.353***	-0.349***	-0.333***	-0.011
					(0.105)	(0.112)	(0.114)	(0.114)	(0.111)	(0.110)	(0.110)	(0.109)	(0.110)	(0.068)
EPS_G $_{i; t-1}$						0.001	0.003	0.003	0.003	0.002	0.002	0.002	0.004	0.004
						(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Rev_G $_{i; t-1}$							-0.084***	-0.079***	-0.093***	-0.045	-0.041	-0.041	-0.024	-0.027
							(0.028)	(0.028)	(0.028)	(0.027)	(0.028)	(0.027)	(0.027)	(0.023)
HHI $_{i; t-1}$								-3.843**	-3.595**	-3.783**	-3.746**	-3.769**	0.420	0.107
								(1.585)	(1.592)	(1.606)	(1.589)	(1.584)	(1.230)	(0.233)
CPI $_{i; t-1}$									0.045***	0.047***	0.048***	0.048***	0.046***	0.036***
									(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.003)
GDP_G $_{i; t-1}$										-0.023***	-0.022***	-0.020***	-0.001	0.003
										(0.002)	(0.002)	(0.003)	(0.003)	(0.002)
REER $_{i; t-1}$											-0.002	-0.002	-0.001	-0.001
											(0.001)	(0.001)	(0.001)	(0.001)
Fisc_Def $_{i; t-1}$												-0.004	-0.001	0.005**
												(0.004)	(0.004)	(0.002)
Constant	0.167***	10.106***	10.530***	10.918***	11.636***	11.870***	11.580***	11.428***	11.401***	11.723***	11.652***	11.758***	11.409***	-0.040
	(0.023)	(1.031)	(0.862)	(0.857)	(0.919)	(0.973)	(1.000)	(0.995)	(0.970)	(0.974)	(0.968)	(0.984)	(1.019)	(0.127)
Observations	5,941	5,926	5,877	5,770	5,157	5,011	5,009	5,009	5,009	5,009	5,009	5,009	5,009	5,009
R-squared	0.003	0.053	0.106	0.110	0.127	0.127	0.129	0.131	0.148	0.172	0.172	0.172	0.275	0.204
Adj. R-squared	0.003	0.054	0.101	0.105	0.121	0.121	0.122	0.123	0.141	0.165	0.165	0.165	0.267	-
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO
Year FE	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	YES
Industry FE	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

5. Robustness Check

In order to increase the scope and validity of this study, I conduct robustness tests using multiple subsamples derived from the full sample used in the main analyses. Robustness samples A1 and A2 examine potential biases related to the high share of Chinese firms within the sample. Robustness samples B1 and B2 investigate the possible influence of industry characteristics, specifically whether the firm operates in a high- or low-emission industry. Robustness samples C1, C2, and C3 account for market uncertainty and investor awareness before, during, and after the COVID-19 pandemic. Finally, robustness samples D1, D2, and D3 introduce a new independent variable, i.e., the relative change in ESG score. Robustness tests are based on Regression 3 with HPR as the dependent variable.

5.1 Impact of Chinese Firms

Given that 3,157 of the 7,541 observations in my sample relate to firms headquartered in China, there is a potential country bias in the analysis. To address this, I rerun my analysis on two subsamples: one comprising firms based in China and the other including firms from all other countries. Just looking at the distribution of ESG scores highlights a notable difference. Over the sample period, China reported an average ESG score of 37, while the rest of the countries reported an average score of 52 (see *Appendix 4*).

Table 12: ESG score and stock performance in China vs. other countries

The table below presents the results of the robustness samples A1 and A2 for firms headquartered in China vs. in other countries. Original results from the full sample based on Regression 3 (13) are reported for comparison. All independent and control variables are lagged by one period. All variables are defined in *Appendix 2*. All continuous variables are winsorized at the 1% level. Standard errors are robust. *, **, *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	Robustness samples A: China vs. other countries						
VARIABLES	(1) CHINA	(2) CHINA	(3) CHINA	(4) OTHER	(5) OTHER	(6) OTHER	FULL SAMPLE
$ESG_{i;t-1}$	0.002	-0.000	-0.001	0.003***	0.003***	-0.001	-0.001*
	(0.002)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Observations	2,093	2,093	2,093	3,143	3,143	3,143	5,236
R-squared	0.216	0.336	0.363	0.093	0.123	0.256	0.270
Adj. R-squared	0.213	0.332	0.358	0.0903	0.120	0.251	0.268
Firm Controls	YES	YES	YES	YES	YES	YES	YES
Country Controls	NO	YES	YES	NO	YES	YES	YES
Year FE	NO	NO	YES	NO	NO	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

As shown in *Table 12*, I find a negative, however not significant, effect of ESG scores on stock performance for Chinese firms. In contrast, when excluding China, the results show positive and significant coefficients (models 4 and 5). This might suggest that the ESG premium identified in the full sample is primarily driven by the weight of Chinese firms as the effect of ESG reverses when China is excluded. Such findings are consistent with the previously discussed fragmentation of EMs. However, as seen in model 6, the coefficient of ESG also turns negative when including year FE. Thus, the positive effect in the non-China sample might as well have been driven by time-varying factors.

5.2 Influence of Industry

As argued by Bolton & Kacperczyk (2021), sustainability premia can vary significantly depending on the firm's industry. Following their approach, I divided the dataset into firms operating in high- and low-emission industries based on average annual carbon emissions. High-emission industries cover utilities, energy, basic materials, industrials, and telecommunications. Results for subsamples B1 and B2 are reported in *Table 13*. High-emission industries show a significant sustainability premium of 0.002 including all controls and year FE (model 3). This premium is slightly higher than the premium of 0.001 in the full sample. In contrast, I find positive and significant effects on the ESG score in low-emission industries, i.e., firms with lower exposure to carbon risk do not experience a premium on their stock returns.

Table 13: ESG score and stock performance in high-emission vs. low-emission industries

The table below presents the results of the robustness samples B1 and B2 for firms operating in low-emission vs high-emission industries. The categorization of industries into low- and high-emission was done according to the average annual total carbon emissions. Original results from the full sample based on Regression 3 (13) are reported for comparison. All independent and control variables are lagged by one period. All variables are defined in *Appendix 2*. All continuous variables are winsorized at the 1% level. Standard errors are robust. *, **, *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	Robustness samples B: High-emission vs. low-emission industries						
VARIABLES	(1) HIGH	(2) HIGH	(3) HIGH	(4) LOW	(5) LOW	(6) LOW	FULL SAMPLE
$ESG_{i,t-1}$	0.002	0.000	-0.002**	0.004***	0.004***	-0.001	-0.001*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Observations	3,058	3,058	3,058	2,178	2,178	2,178	5,236
R-squared	0.146	0.191	0.286	0.104	0.154	0.280	0.270
Adj. R-squared	0.143	0.188	0.281	0.100	0.149	0.273	0.268
Firm Controls	YES	YES	YES	YES	YES	YES	YES
Country Controls	NO	YES	YES	NO	YES	YES	YES
Year FE	NO	NO	YES	NO	NO	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

This is in line with previous results. As seen before, the positive effect reverses when controlling for year FE (model 6).

My findings differ from those of Bolton & Kacperczyk (2021). Their study shows that for U.S. firms, excluding high-emission industries increases the positive impact of carbon emissions on returns, implying higher premia. This might reflect investor sensitivity to sustainability in "greener" industries (Bolton & Kacperczyk, 2021). Interestingly, in my EM dataset, high-emission industries do not report lower overall ESG scores than one would initially expect (see *Appendix 4*). The significant ESG premium for high-emission industries (model 3) indicates that investors view sustainability as a risk factor, especially in these sectors. My results suggest that investors respond differently to U.S. firms compared to those in EMs.

5.3 Influence of COVID-19

Further, I test the robustness of my results by splitting the dataset into three different periods (before, during, and after COVID-19) to assess the stability of the results. I particularly consider the impact of COVID-19 on the level of market uncertainty and investor awareness of sustainability. This aligns with Bolton & Kacperczyk (2021), who analyze how investor awareness affected the carbon premium before and after the Paris Agreement in 2015. They find that carbon premia increased after 2015, though this effect does not hold after controlling for sample size. Other research suggests that COVID-19 strongly increased investor awareness of sustainability (CFA Institute, 2020) including in EMs (Goel et al., 2022). The results are presented in *Table 14*.

During the pandemic, I find a negative, though not significant, effect of ESG scores on stock returns. I report a positive and significant coefficient for ESG scores both before and after the COVID-19 pandemic (models 1, 2, and 5). The effect after the crisis is not stronger than before, contradicting the idea of an increase in investor awareness by Bolton & Kacperczyk (2021).

The period split supports my earlier results from Regression 1 which showed that investors demand compensation for sustainability risks only during economic crises.

Table 14: ESG and stock performance before, during, and after COVID-19

The table below presents the results of the robustness samples C1, C2, and C3 for the period before, during, and after COVID-19. The subsample before COVID-19 covers the years 2014-2019. The subsample during COVID-19 relates to 2020 and 2021, while after COVID-19 covers the years 2022-2023. Original results from the full sample based on Regression 3 (13) are reported for comparison. All independent and control variables are lagged by one period. All variables are defined in *Appendix 2*. All continuous variables are winsorized at the 1% level. Standard errors are robust. *, **, *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	Robustness samples C: Before, during vs. after COVID-19						
VARIABLES	(1) BEFORE	(2) BEFORE	(3) DURING	(4) DURING	(5) AFTER	(6) AFTER	FULL SAMPLE
ESG $_{i, t-1}$	0.006***	0.005***	-0.001	-0.005	0.004**	0.001	-0.001*
	(0.001)	(0.001)	(0.004)	(0.004)	(0.002)	(0.002)	(0.001)
Observations	1,891	1,891	1,396	1,396	1,949	1,949	5,236
R-squared	0.163	0.199	0.133	0.220	0.185	0.290	0.270
Adj. R-squared	0.160	0.193	0.128	0.213	0.181	0.286	0.268
Firm Controls	YES	YES	YES	YES	YES	YES	YES
Country Controls	NO	YES	NO	YES	NO	YES	YES
Year FE	NO	NO	NO	NO	NO	NO	YES
Firm FE	YES	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Overall, the results show that market uncertainty impacts the relationship between sustainability and stock performance. However, increased investor awareness after the pandemic did not affect the pricing of ESG risks in EMs.

5.4 Change in ESG Score

Following the approach of Bolton & Kacperczyk (2021), who introduce the growth rate in carbon emission as an additional independent variable, I replicate Regression 3 using the relative change in ESG score. I analyze three subsamples: The first considers the relative change in ESG score across the full dataset, while the other two categorize firms based on extreme changes in ESG score. The second subsample includes firms with score changes below the 25th percentile (strongly negative), while the third includes the ones with a change above the 75th percentile (strongly positive). The rationale for these subsamples is that investors, as suggested by Hartzmark & Sussman (2019), tend to focus on firms with extreme changes in ESG ratings.

Table 15 presents the results from the final robustness sample. The overall change in ESG score did not significantly impact HPRs. Firms that experienced a strong negative change in ESG score reported a significant increase in returns (models 4 and 5). In contrast, strong improvements in ESG scores did not yield any significant effect on HPRs, suggesting that investors primarily react to deteriorations in ESG performance.

Table 15: Change in ESG score and stock performance

The table below presents the results of the robustness samples D1, D2, and D3 which introduce the change in ESG score, computed as the natural logarithm of ESG_t / ESG_{t-1} as the new independent variable. D1 uses the overall change in the ESG score on the full dataset. D2 and D3 divide the sample by firms that had a strongly negative change in ESG score, i.e., below the 25th percentile, and a strongly positive change, i.e., above the 75th percentile, respectively. All control variables are lagged by one period. All variables are defined in *Appendix 2*. All continuous variables are winsorized at the 1% level. Standard errors are robust. *, **, *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	Robustness sample D: Change in ESG score								
VARIABLES	(1) OVERALL	(2) OVERALL	(3) OVERALL	(4) NEGATIVE	(5) NEGATIVE	(6) NEGATIVE	(7) POSITIVE	(8) POSITIVE	(9) POSITIVE
Change in ESG (relative)	0.016	0.027	0.029	0.276**	0.265**	0.118	0.059	0.071	0.069
	(0.030)	(0.029)	(0.027)	(0.124)	(0.122)	(0.112)	(0.058)	(0.053)	(0.050)
Observations	5,236	5,236	5,236	2,556	2,556	2,556	1,299	1,299	1,299
R-squared	0.122	0.165	0.270	0.114	0.150	0.285	0.117	0.204	0.335
Adj. R-squared	0.120	0.163	0.267	0.111	0.146	0.279	0.111	0.197	0.324
Firm Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES
Country Controls	NO	YES	YES	NO	YES	YES	NO	YES	YES
Year FE	NO	NO	YES	NO	NO	YES	NO	NO	YES
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The more severe the downgrade in ESG score, the higher the demanded risk premium by investors. However, this effect is mitigated once year FE are included.

6. Conclusion

This study investigates whether investors in EMs demand compensation for higher exposure to ESG risks, i.e., for firms with weaker sustainability profiles. I analyze Emerging market data from 2014 to 2023 to examine the effect of ESG, ESGC, and S scores on stock returns using cross-sectional and time-series regressions. First, my results show that during economic crises, investors expect additional compensation for ESG risks. This effect diminishes post-crisis, suggesting that investors may be more willing to accept ESG risks when the market stabilizes. Further, profitability plays a significant role in how ESG risks are perceived in EMs. Higher profitability results in a lower effect of sustainability measures, suggesting that financial stability is prioritized by investors in these more volatile markets. Lastly, I find that time-varying factors heavily impact sustainability premia. This underlines the crucial role of macroeconomic developments and shifts in investor sentiment on how ESG factors are priced in EMs. Importantly, the results were consistent regardless of the sustainability measure used, whether ESG, ESGC, or the S score was used, demonstrating robustness across different indicators. Further robustness tests support the reliability of my findings.

My study faces several limitations. First, EMs have a very fragmented nature with varying regulatory frameworks, levels of economic development, and market maturity. As observed in the robustness test on China, country-specific factors can strongly impact the pricing of sustainability risks. Second, annual ESG data introduces timing challenges as CSR reports are typically published with significant delays up to 6 to 10 months after financial reports, and in some cases even longer[12]. This limits the ability to capture more immediate market reactions to sustainability performance. As mentioned in the beginning, ESG metrics suffer from a lack of standardization and consistency. The results of my study might change when using the ESG scores of other rating providers with a different methodology. Lastly, my results might be skewed due to a smaller sample size compared

[12] According to LSEG, ESG data is updated annually based on the fiscal year of a firm. CSR and ESG reports are typically disclosed 4-6 weeks after corporate reports, but there is no mandatory timeline for ESG report filings. As stated by LSEG, "on average, there is a 6–10-month delay in reporting the CSR reports when compared to financial reports and this could extend up to 1 year or more depending on the company" (LSEG Frontline Support, personal communication, October 10, 2024).

to Bolton & Kacperczyk (2021). This is largely a result of limited data availability in EMs, where ESG reporting and coverage are often less comprehensive. As a consequence, my findings may not fully capture the true extent of sustainability premia in these markets.

Future research could expand to include a broader set of countries within EMs and incorporate more extensive company data over a longer time period. Further research could address the unique characteristics of EMs to better understand the impact of sustainability under different contexts.

Overall, this study contributes to the understanding that investors price sustainability-related risks in EMs, though the extent and direction of this pricing are shaped by country- and industry-specific characteristics, and time-varying factors.

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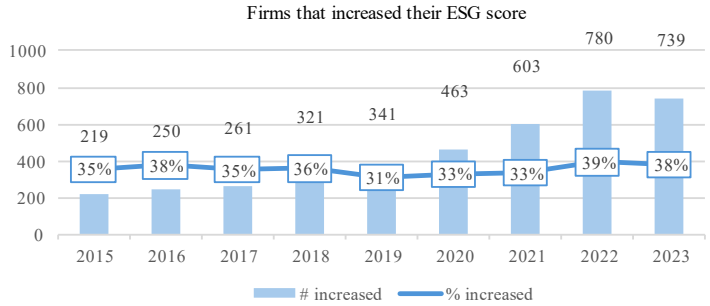
Appendix

Appendix 1: Firms with an increase in ESG score over time

The figure below shows the number as well as the percentage of firms relative to the whole sample that were able to increase their ESG score from one year to the next.



Appendix 2: Variables description

The following table shows descriptions and sources of the dependent, independent, and control variables used in the course of this study. *Panel A* shows the dependent performance variable. *Panel B* shows independent sustainability variables. *Panel C* shows firm-specific control variables. *Panel D* shows country-specific control variables. Panel E shows the five Fama and French Factor variables and Momentum for EMs.

Variables	Unit	Use	Description	Source	Reference
Panel A: Performance variables					
HPR	-	dependent	HPR is the annual holding period return computed using the closing price.	LSEG Workspace	McCallum (1975)
Panel B: Sustainability variables					
ESG	[0;100]	independent	ESG represents the Environmental, Social, and Governance score of a firm.	LSEG Workspace	Asimakopoulos et al. (2023)
ESGC	[0;100]	independent	ESGC is the ESG Combined score of a firm.	LSEG Workspace	
S_Score	[0;100]	independent	S score is the Social pillar score.	LSEG Workspace	
Panel C: Firm-specific variables					
Log_Assets	USD	control	LogAssets is the natural logarithm of total assets.	LSEG Workspace	Bolton & Kacperczyk (2021)
BM	-	control	BM is the book-to-market ratio, calculated as the book value of equity divided by the market value of equity.	LSEG Workspace	
Leverage	-	control	Leverage is the debt-to-equity ratio, calculated as the total debt divided by the total equity.	LSEG Workspace	
ROE	-	control	ROE is the return on equity, defined as the net income divided by the book value of equity.	LSEG Workspace	
HHI	-	control	HHI represents the Herfindahl-Hirschman Index based on the revenue distribution across industries.	LSEG Workspace	
Revenue_G	-	control	Revenue Growth is the annual growth rate of total business revenue.	LSEG Workspace	
EPS_G	-	control	EPS Growth represents the annual growth rate of earnings per share.	LSEG Workspace	
Panel D: Country-specific variables					
CPI	-	control	CPI is the Consumer Price Index used as a measure of inflation.	IMF / FRED	Beck et al. (2005)
GDP_G	-	control	GDP_G is the annual growth rate of Gross Domestic Product.	FRED	
REER	-	control	REER represents weighted averages of bilateral exchange rates adjusted by relative consumer prices.	FRED	Aman et al. (2024)
Fiscal_D	-	control	Fiscal Deficit is the difference between a government's total revenue and total expenditure, expressed as a percentage of GDP.	FRED	Afonso & Jalles (2015)
Panel E: Factor variables					
MktRF	-	control	MktRF is the annual market risk premium, calculated as the excess return of the market over the risk-free rate.	Kenneth R. French Data Library	Bolton & Kacperczyk (2021)
SMB	-	control	SMB represents the annual return on a portfolio long on small-cap stocks and short on large-cap stocks, representing the size premium.	Kenneth R. French Data Library	
HML	-	control	HML is the annual return on a portfolio long on value stocks and short on growth stocks, representing the value premium.	Kenneth R. French Data Library	
CMA	-	control	CMA is the annual return on a portfolio long on conservative investment stocks and short on aggressive investment stocks.	Kenneth R. French Data Library	
MOM	-	control	MOM is the annual return on a portfolio long on stocks with high past returns and short on stocks with low past returns, representing the momentum factor.	Kenneth R. French Data Library	
RMW	-	control	RMW is the annual return on a portfolio long on high-profitability stocks and short on low-profitability stocks.	Kenneth R. French Data Library	Avramov et al. (2023)

Appendix 3: Cross-correlation matrix

The table below reports cross-correlations across selected variables.

Cross-correlation matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) ESG	1.000											
(2) ESGC	0.974	1.000										
(3) S_Score	0.896	0.869	1.000									
(4) G_Score	0.584	0.575	0.288	1.000								
(5) E_Score	0.823	0.798	0.696	0.255	1.000							
(6) LogAssets	0.246	0.214	0.218	0.079	0.294	1.000						
(7) BM	0.015	0.002	0.034	-0.047	0.040	0.275	1.000					
(8) Leverage	0.007	0.006	0.002	0.014	0.000	0.310	0.102	1.000				
(9) ROE	0.088	0.086	0.093	0.061	0.063	-0.064	-0.315	-0.076	1.000			
(10) EPS_G	-0.011	-0.007	-0.023	0.014	-0.005	0.002	-0.164	-0.049	0.235	1.000		
(11) Revenue_G	-0.081	-0.075	-0.092	-0.002	-0.069	-0.035	-0.182	-0.019	0.287	0.251	1.000	
(12) HHI	0.084	0.055	0.045	0.047	0.131	0.464	0.095	0.078	0.002	-0.003	-0.014	1.000

Appendix 4: Distribution of ESG scores across subsamples

The figure presents the distribution of ESG scores across different subsamples, including firms in high-emission industries, low-emission industries, firms headquartered in China, and firms headquartered in all countries excluding China compared to the full sample.