



Deconstructing ESG Ratings Performance

Risk and Return for E, S and G by Time Horizon,
Sector and Weighting

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Executive Summary

How are environmental, social and governance (ESG) ratings constructed? Which indicators are the most important in assessing ESG characteristics? Does the answer vary by sector?

Previously, we have shown that ESG information can be transferred via the economic transmission channels of profitability, idiosyncratic risk and systematic risk. This study extends that research to two types of ESG indicators. First, we examined the impact of individual E, S and G scores (“pillar scores”) on financial valuations. At a more granular level, we also studied how the 11 ESG Key Issue scores – which are proxies for ESG characteristics – have affected these relationships over various periods and equity universes. Lastly, we investigated sectoral differences as well as how different approaches weight E, S and G.

We found that ESG pillars and ESG Key Issues, which underpin MSCI ESG Ratings, related differently to companies’ financial performance. For instance, depending on the time horizon, industry and weighting scheme used, the relationship between simulated portfolios and performance varied.

Time horizons: Governance pillar scores proved to be far more significant than Environmental and Social pillars over a relatively short period (one year) in terms of their impact on profitability, idiosyncratic risk and systematic risk, as they were most directly linked to short-term events and incident risks.

By contrast, Environmental and Social indicators were more significant over longer periods, as reflected in stock-price performance over the study period (2006-2019).

For example, carbon emissions and labor management showed no or minimal significance on profitability, idiosyncratic risk and systematic risk in the short term. However, it demonstrated the largest long-term performance impact of all 11 ESG Key Issues.

Sectoral differences: Across all sectors, the Governance pillar provided the largest impact when comparing the top and bottom quintiles, followed by the Environmental and Social pillars, respectively.

Governance was especially germane in the financials and consumer discretionary Global Industry Classification Standard (GICS®¹) sectors, while the Environmental pillar showed strong significance in the materials and energy sectors. The Social pillar was most significant in the consumer discretionary sector.

Sectoral differences reflected industry-specific ESG Key Issues underlying the Environmental and Social pillars. For example, the energy sector can be affected by

¹ GICS, the global industry classification standard jointly developed by MSCI and Standard & Poor’s.

industry-specific Social Key Issues – such as worker safety and labor relations (e.g., when an accident or strike occurs). In comparison, information technology might be more affected by human capital issues.

Different weighting schemes: How ratings are constructed can have a significant impact on their usefulness to investors. For example, equally weighting E, S and G pillar scores across sectors demonstrated less significance than the stand-alone G pillar score over the study period.

In contrast, a weighting scheme created by backward-optimizing the statistical confidence level (measured by its t-statistic) of the sector-specific ESG weighting scheme demonstrated greater significance than the stand-alone G pillar score. Thus, adding environmental and social risk indicators based on specific sectors improved aggregate ESG scores from December 2006 to the end of 2019.

However, the backward-optimization approach may underestimate the importance of ESG indicators to financial results over an extended period, as indicators that have not had a financial impact historically may have shown greater significance in subsequent periods.

Over the study period, the top quintiles (based on overall MSCI ESG scores) of our investment universe demonstrated greater performance than the bottom quintile. Moreover, they demonstrated a lower level of cyclicity than either the equal-weighted or backward-optimized ESG scores.

These results highlight the importance of measuring performance over different periods in which varying ESG issues may be financially relevant. They also illustrate the historical value of applying an industry-specific approach to using relevant ESG Key Issues as a proxy for the ESG characteristics of firms.

Introduction

An increasing number of studies from academia and the asset management industry have investigated the potential financial benefits of ESG investing. Friede et al. (2015), for instance, conducted a meta-analysis of over 2,000 such studies. Numerous new studies have since been published. The results of these studies differ significantly depending on which ESG methodologies were used (e.g., various types of ESG scores or industry exclusions) and which financial metrics (e.g., stock price or exposure to Fama-French factors) were employed to assess the impact of ESG on stock performance. Thus, given the variation in conceptualization and construction of both independent and dependent variables in these studies, it is unsurprising that there is no clear consensus on how ESG considerations have affected performance.

Further, the increasingly prevalent use of ESG considerations raises another question: To what extent are the ESG characteristics of firms reflected in their aggregated ESG score or their respective E, S and G scores? The dizzying array of topics regarding the environment, social and governance are so dissimilar (from corporate governance to water stress to human capital) that they are unlikely to have an equal impact on company performance.

Understanding the relative significance of the different ESG issues is not only important for advancing the theoretical underpinnings of how ESG captures hard-to-observe firm characteristics that ultimately translate into an observed performance but also critical for the advanced integration of ESG factors into stock selection and portfolio construction. As investing with ESG principles continues to gain momentum, more investors employ third-party *ESG ratings* in the construction of their own proprietary models to construct *ESG scores* or some combination of the two approaches.² There are many ways to construct a company ESG score, involving different combinations of financial and nonfinancial inputs. Determining the most influential criteria on firm performance may be overlooked in the rush to “do some ESG.”

This study builds on previous research in which we identified three economic transmission channels — the cash-flow, idiosyncratic risk and valuation channels — through which ESG information was conveyed to financial risk and performance (Giese et al. 2019a). We used data that are more granular than those in the previous research. Specifically, we employed the Environmental, Social and Governance pillar scores and their underlying Key Issues scores, which underpin MSCI ESG Ratings. We investigate the following questions.

² ESG scores are used in creating ESG ratings and, thus, are more granular, as we discuss later.

Part A: E, S and G Pillars and Financial Performance

- Have companies' management of industry-specific environmental issues (as measured by the E pillar score), social issues (S pillar score) and governance issues (G pillar score) impacted financial performance differently?
- How have these issues been reflected in the financial fundamentals and stock performance of companies?
- Are there sectoral differences in how E, S and G pillar scores have contributed to financial performance?

This section employs the MSCI ESG pillar scores from 2006 to 2019 regarding companies included in the MSCI World Index (covering developed-market large- and mid-cap stocks).

Part B: Underlying ESG Key Issues and Financial Performance

- Have companies' management of specific Key Issues that underly the E, S and G pillars (e.g., carbon emissions and human capital development) impacted financial performance differently? How have these issues been reflected in companies' financial fundamentals and their stock performance?
- Are there sectoral differences in how Key Issue scores have contributed to financial performance?

We use the complete universe of MSCI ESG-rated companies in the MSCI ACWI Investable Market Index (IMI) (which includes large-, mid- and small-cap stocks across developed and emerging markets) from 2012 to 2019 for ESG pillar scores and Key Issue scores.³

Part C: The Role of Weights in Aggregation

- Is the sum of the parts (E, S and G) more powerful than the whole?
- How did financial results differ depending on the relative weighting of E, S, G pillar scores?

³ This section employed a larger universe to obtain a sufficient number of stocks for each Key Issue. However, ESG-related data was not available prior to 2012, thereby accounting for the shorter period.

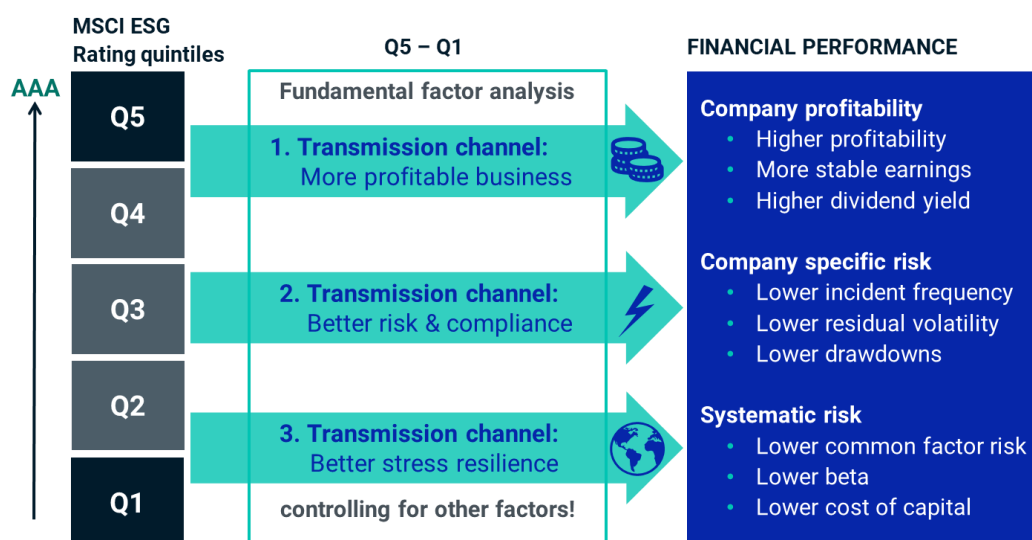
Data and Methodological Approach

This study extends the approach proposed by Giese et al. (2019a) that identified three economic transmission channels from ESG characteristics to financial risk and performance. These channels can be summarized as follows (see the schematic in Exhibit 1):

1. **Cash-flow channel:** Companies with high MSCI ESG Ratings on average have historically been more profitable, displayed more stable earnings and paid higher dividend yields, controlling for other financial factors. The economic rationale suggests that stronger ESG characteristics may have been linked to better business practices, such as attracting more talented employees, better innovation management, long-term business plans, incentive plans for management and better customer satisfaction (Fatemi et al. 2015).
2. **Idiosyncratic risk channel:** Companies with high MSCI ESG Ratings have historically shown lower financial drawdown frequencies, controlling for size and industry. These results are intuitive, as companies with high MSCI ESG Ratings were considered to have been better able to manage and mitigate company-specific risks than lower-ranked sector peers.
3. **Valuation channel:** Companies with high MSCI ESG Ratings have historically shown lower levels of systematic risk, lower costs of capital and, thus, higher levels of valuations. For example, we have shown lower levels of volatility for high-rated companies via MSCI's Global Equity Model for Long-Term Investors (GEMLT) risk model while controlling for other factors. Moreover, some MSCI ESG indexes have shown lower drawdowns than their market-capitalization-weighted parent indexes in crises (Giese et al. 2019b; Lodh 2020). The economic rationale is intuitive: Companies with strong ESG characteristics may have been more resilient when faced with changing market environments, such as fluctuations in financial markets and changes in regulation. Researchers have found that companies with stronger ESG characteristics have experienced less exposure to risks and higher levels of valuation.⁴ Fatemi, Fooladi and Tehrani (2017) argued that the lower level of risk of companies with strong ESG characteristics could be explained by their potentially having more loyal employees and customers, a lower chance for facing lawsuits and, thus, a higher chance for long-term survival. We also developed a model to show that firms with high chances of survival have had high valuation levels.

⁴For example, see Eccles (2014), El Ghoul et al. (2011) and Gregory et al. (2014).

Exhibit 1: Economic Transmission Channels to Be Tested



Source: MSCI ESG Research LLC.

Regarding how the top-level E, S and G scores are constructed, one can, for instance, construct an approach using only company-disclosed information. Another may employ only news sources. Weighting issues are also important. For example, one approach may equally weight all E, S and G topics, and another may selectively weight only a handful of topics by industry. These varying methodologies have resulted in low correlations among third-party ESG ratings (Berg et al. 2019).

Hence, relationships between ESG and financial performance are difficult to generalize without a precise understanding of the underlying components and how these components are aggregated.

MSCI ESG Ratings are based on a GICS sub-industry-specific identification of Key Issues, chosen from a library of environmental, social and governance risk issues, as shown in Exhibit 2. The selection of Key Issues per sub-industry is based on a fundamental assessment of how financially relevant a given key risk is in a specific industry – that is, how likely it is that the key risk can influence companies' revenues or assets. The Key Issue scores under each pillar category are used to calculate the respective E, S and G pillar scores, employing sub-industry-specific weights. For a given sub-industry, the weight for many Key Issues can be zero as only four to nine ESG Key Issues typically are deemed relevant. Hence, the E, S and G pillar scores reflect different underlying Key Issues across the sub-industries. The pillar scores are then combined in an aggregate MSCI ESG score, which is then used in creating MSCI ESG Ratings.

Significantly, these Key Issue scores measure companies' exposure to and the management of related risks. For instance, the carbon emissions Key Issue score (discussed later in this paper) measures how companies manage their carbon emissions *relative to* their exposure to potential regulatory risks regarding carbon, which is not the same as merely measuring companies' carbon emissions.

Exhibit 2: MSCI ESG Rating Model and Underlying Key Risk Issues

MSCI ESG Score									
ENVIRONMENT PILLAR				SOCIAL PILLAR				GOVERNANCE PILLAR	
Climate Change	Natural Capital	Pollution & Waste	Env. Opportunities	Human Capital	Product Liability	Stakeholder Opposition	Social Opportunities	Corporate Governance	Corporate Behavior
Carbon Emissions	Water Stress	Toxic Emissions & Waste	Clean Tech	Labor Management	Product Safety & Quality	Controversial Sourcing	Access to Communication	Board	Business Ethics
Product Carbon Footprint	Biodiversity & Land Use	Packaging Material & Waste	Green Building	Health & Safety	Financial System Instability		Access to Finance	Pay	Anti-Competitive Practices
Financing Environmental Impact		Electronic Waste	Renewable Energy	Human Capital Development	Financial Product Safety		Access to Health Care	Ownership	Corruption & Instability
Climate Change Vulnerability				Supply Chain Labor Standards	Privacy & Data Security		Opportunities in Nutrition & Health	Accounting	Financial System Instability
					Responsible Investment				Tax Transparency
					Insuring Health & Demographic Risk				

Soft Drink Sub-Industry: e.g. Coca-Cola

Source: MSCI ESG Research LLC. As an example, the boxes outlined in blue show key risk issues used in the soft drink sub-industry. The gray boxes in the corporate governance category are used in every industry.

To assess which ESG indicators have driven financial results, we replicated the financial analysis by Giese et al. (2019a) at two different levels of the MSCI ESG Rating methodology – E, S and G pillar scores and Key Issue scores. The financial variables are grouped into the three transmission channels (Exhibit 1).

We analyzed the transmission channels using MSCI ESG Ratings⁵ for the MSCI World Index from December 2006 to December 2019. The universe contained, on average, over 1,600 stocks.

The results displayed in this paper were neutralized for industry exposure. This neutralization was a byproduct of using MSCI's ESG scores, which are relative to the industry. Moreover, we analyzed the extent to which MSCI ESG scores and E, S and G

⁵ For more information, see: <https://www.msci.com/esg-investing>

pillar scores may be correlated to equity style factors (Exhibit 3). While there have been only fairly weak correlations to quality factors (profitability, earnings variability), the correlation to large caps (size) and mid-cap exposure was the most significant.

Exhibit 3: Correlation of E, S and G Scores with GEMLT Style Factors

	ESG score	E score	S score	G score	correl
Size	0.16	0.18	0.07	0.00	
Investment Quality	0.09	0.07	0.06	0.06	
Dividend Yield	0.08	0.06	0.04	0.07	
Profitability	0.06	0.05	0.03	0.08	
Long-Term Reversal	0.03	0.01	0.03	-0.04	
Earnings Quality	0.02	0.04	0.04	0.00	
Momentum	0.01	0.02	0.00	0.05	
Earnings Yield	-0.01	0.00	-0.03	0.02	
Leverage	-0.03	0.04	-0.01	-0.04	
Growth	-0.03	-0.02	-0.02	-0.02	
Liquidity	-0.04	-0.06	-0.02	0.03	
Beta	-0.04	-0.01	-0.01	-0.08	
Book-to-Price	-0.07	-0.08	-0.03	-0.07	
Residual Volatility	-0.09	-0.08	-0.05	-0.14	
Earnings Variability	-0.14	-0.12	-0.07	-0.10	
Mid Capitalization	-0.16	-0.19	-0.07	0.00	

Source: Barra GEMLT. Data from December 2006 to December 2019 for the MSCI World Index.

To ensure that size effects did not drive the findings of our analysis, we created size-adjusted E, S and G pillar scores to be employed in the quintile analysis (see Exhibit A1 in the Appendix). We used the size neutralization process for MSCI Industry-Adjusted ESG scores;⁶ the individual E, S and G pillar scores; and the Key Issue scores in our analysis of the strength of economic transmission channels. However, for simplicity of interpretation, we did not apply size neutralization to the stock-price performance analysis to make the simulated portfolios closer to actual portfolios. All risk, return attributions and factor calculations were performed using MSCI's Global Equity Model for Long-term Investors (GEMLT).

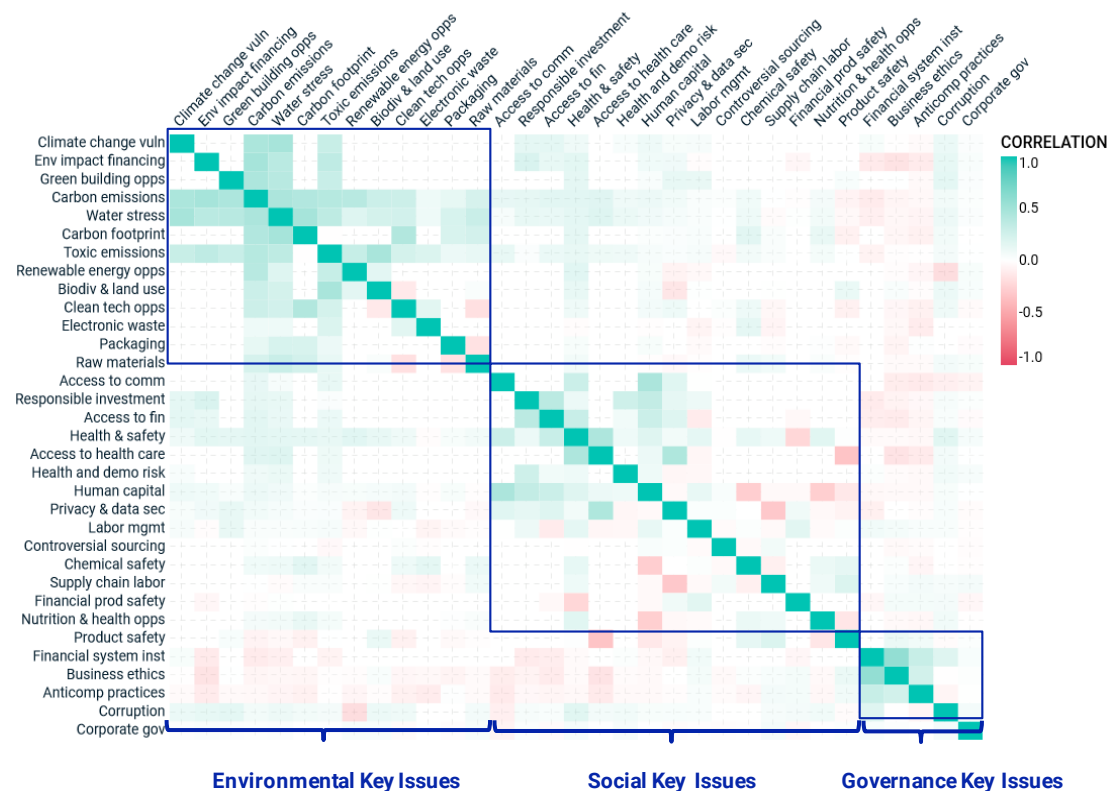
⁶ MSCI Industry-Adjusted ESG scores ("ESG scores") measure companies' financially most significant ESG-related risks and opportunities. Moreover, they are normalized per industry to a standard scale between 0 and 10 to avoid industry biases. MSCI ESG scores are calculated based on public and private information, as well as a risk assessment by MSCI ESG analysts.

Were E, S and G Pillars and Key Issues Correlated?

To analyze the financial relevance of E, S and G pillar and Key Issue scores employed within the MSCI ESG Rating model, we first assess the extent to which the different ESG indicators are independent. Exhibit 4 shows the historical correlation matrix of Key Issue scores used within the MSCI ESG Rating methodology.

Historically, the Key Issues used in the rating methodology showed a low degree of correlation to each other except for a few under the Environmental pillar (the top left portion of the exhibit). We concluded that these scores have largely measured different things. Moreover, companies' exposure to and management of one type of ESG risk has not been correlated to its exposure or management of other types of ESG risks.

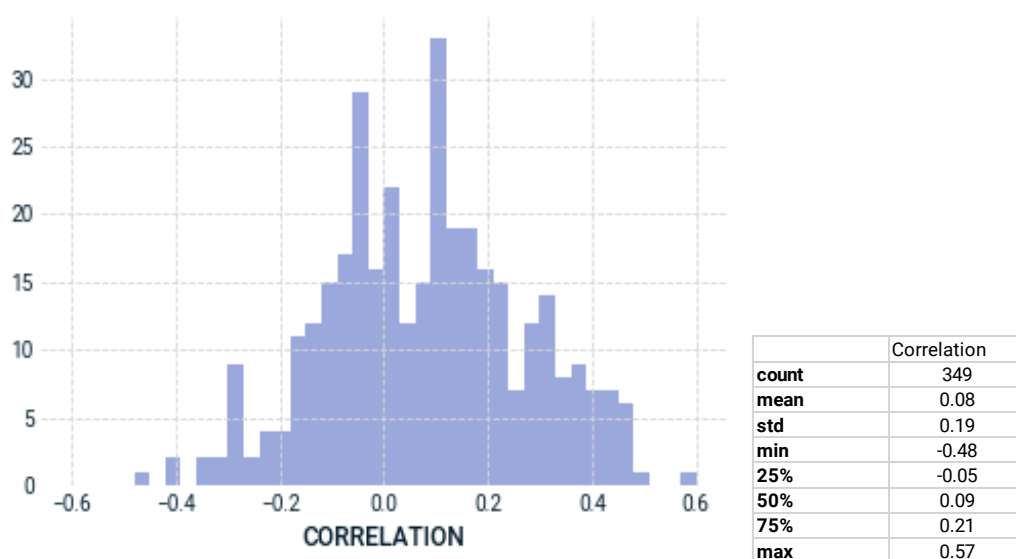
Exhibit 4: Key Issue Correlation Matrix



Source: MSCI ESG Research LLC. Data from 2013-2019, covered securities within MSCI ACWI IMI. Due to the industry-specific relevance of Key Issues, not all Key Issues were scored for all companies. We only show pairwise correlations where the common coverage of the two Key Issues was larger than 20 stocks.

This finding is confirmed when we consider the correlation of Key Issues. Exhibit 5 presents the distribution of pairwise Key Issue correlations. The distribution shows a roughly bell-shaped correlation curve with a mean correlation that is close to zero and a maximum pairwise correlation of 0.57 under the Environmental pillar, where carbon emissions, water stress and toxic emissions showed a positive correlation. The higher correlation of these three indicators is driven by exposure to the utilities, energy and mining sectors. Their signals overlapped somewhat as thermal power generation, oil extraction and mining employed water intensively and generated high levels of pollution. This correlation may also reflect a tendency for companies in these industries to manage operational risks through a common environmental management system.

Exhibit 5: Distribution of Pairwise Key Issue Correlations



Source: MSCI ESG Research LLC. Data from 2013-2019, covered securities within MSCI ACWI IMI.

Moreover, Exhibit 6 shows the average values of Key Issue correlations within the three pillars. Average correlations of Key Issues within pillars were relatively low, with the highest average level of correlations of 0.25 found within the E pillar. Average cross-pillar correlations were even lower: Only Key Issues under the E and S pillars showed a mild level of average correlations of 0.13.

Exhibit 6: Average Pairwise Key Issue Correlations Under E, S and G Pillars

	E	S	G
E	0.25	0.13	-0.023
S	0.13	0.059	-0.014
G	-0.023	-0.014	0.14

Source: MSCI ESG Research LLC. Data from 2013-2019, covered securities within MSCI ACWI IMI.

Thus, the average Key Issue correlations within the coverage universe of companies were reasonably low during the study period, except for the Environmental pillar. Hence, we view Key Issues as approximately independent indicators in the subsequent analysis of their financial relevance.

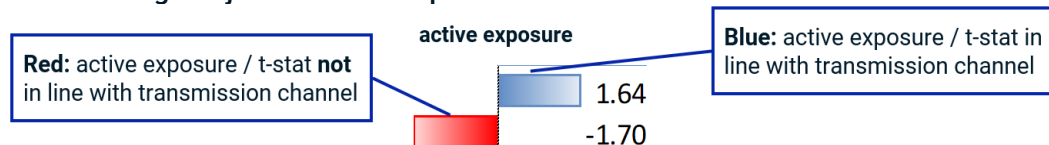
Display of Results

In the following analysis, we show the distribution of financial variables across five size-adjusted pillar score quintiles (Q1 to Q5), which were rebalanced monthly, with Q1 indicating companies with the lowest pillar score and Q5 companies with the highest pillar score. In the MSCI ESG Rating model, a higher score stands for better ESG characteristics. Financial variables, such as beta or book-to-price ratio, are based on the GEMLT and are therefore in the format of z-scores.⁷

For each of these variables, we assessed their *active exposure* to ESG, defined as the quintile difference (Q5-Q1) of financial variables in the z-score format over the study period. This process helps us determine whether the financial results support the transmission channels. Moreover, it provides a measure of statistical confidence (the *t-statistic*), as shown in Exhibit 7.

⁷ Z-scores are normalized values, calculated by first subtracting the cross-sectional mean from all values and dividing the difference by the cross-sectional standard deviation. Z-scores have zero mean and unit standard deviation. Following the GEMLT methodology, for risk-related variables, we subtract cross-sectional global means. For fundamental data-related variables, we subtract cross-sectional country means to control for potential country biases in the fundamental data. Standard deviation is calculated globally.

Exhibit 7: Sign-Adjusted Active Exposure and T-statistics



Source: MSCI ESG Research LLC.

We used the differences in active exposure as a measure of financial significance because it can be employed for a broad range of economic indicators (e.g., profitability, valuation and volatility). The same active exposure corresponds to the same difference in units of cross-sectional standard deviation across all economic variables.

We indicated active exposures in blue if the sign is in line with the respective transmission channel and red if it is not. We expected a positive active exposure in the first transmission channel (i.e., higher profitability) and negative active exposures in the second and third transmission channels (i.e., lower idiosyncratic risk and lower systematic risk).⁸

Similarly, we show the t-statistic in blue if Q5-Q1 was in line with the transmission channels; otherwise, we flip the sign of the t-statistic and show the value in red.

The following section first analyzed the economic transmission channels using these quintile differences, using a one-year time horizon. We then examined simulated portfolio performance using our MSCI World Index quintiles over the study period.




⁸ Op. cit., Giese (2019a).

Part A: E, S and G Pillars and Financial Performance

We began our financial analysis using the aggregate MSCI ESG scores and a breakdown of the results into individual pillar scores in terms of their active exposures to E, S and G (Exhibit 8⁹). This analysis is important for understanding how each of the economic transmission channels performed across the three pillars.

The results for the overall MSCI ESG scores were in line with Giese et al. (2019a). All quintile results showed the expected sign. In particular, the difference in stock-specific risk (residual volatility) and systematic volatility displayed significant differences between the best-rated companies (Q5) and the lowest-rated companies (Q1). Differences in profitability and valuation were also consistently in line with the transmission channels.

Exhibit 8: Active Exposure Analysis of MSCI ESG Scores Including Pillar Breakdown

Transmission Channel		Expected sign Q5 - Q1	Active exposure				Value of 1 standard deviation
			MSCI ESG score	E z-score	S z-score	G z-score	
	Gross Profitability	+	0.13	0.05	0.06	0.24	18.4%
	Trailing Dividend Yield	+	0.14	0.12	0.08	0.12	1.8%
	Residual CAPM Volatility	-	-0.26	-0.27	-0.12	-0.29	10.1%
	Kurtosis	-	-0.06	-0.04	-0.04	-0.05	1.68
	Systematic Volatility	-	-0.23	-0.20	-0.09	-0.33	3.9%
	Variability in Earnings	-	-0.15	-0.07	-0.14	-0.16	36.2%
	Historical beta	-	-0.09	0.07	-0.02	-0.18	0.49
	Book-to-price	-	-0.11	-0.05	-0.01	-0.21	39.9%
	Predicted ETOP	-	-0.10	-0.07	-0.09	-0.05	3.2%
3-Channel Average			0.15	0.10	0.07	0.18	
			<div> <div>Top-level ESG scores</div> <div>ESG Pillar breakdown</div> </div>				

Source: MSCI ESG Research LLC. Data from December 2006 to December 2019 for the MSCI World Index. The last column shows the value of exposure to a variable equal to 1 and expressed in the underlying raw data. For example, an active exposure of 0.24 for the gross profitability of the Governance score corresponds to a difference of roughly 4.4 in the underlying profitability. A blue bar means the sign of the active exposure is in line with the economic transmission channel, and red indicates the opposite. In the third column from the left, we indicate the expected sign of Q5-Q1 based on the transmission channels: We expected a positive sign for profitability and dividend yield and a negative sign for risk-related variables.

⁹ T-statistics are shown in Exhibit A2 in the Appendix.

The E, S and G pillars show that the G score was the most significant during this one-year measurement period, while the S score was the weakest. To facilitate a comparison of the different pillars, we have included an (equal-weighted) average active exposure¹⁰ (“three-channel average” – weighted according to the expected sign) and a t-statistic across the three transmission channels as a proxy for the overall significance for each of the E, S and G pillar scores.

Sectoral Differences

To ascertain whether the economic transmission channels worked with different sectors, we repeated the analysis above using quintile portfolios for each GICS sector. However, when disaggregating the MSCI World Index of about 1,600 securities into 11 GICS sectors, the statistical confidence level dropped due to the smaller number of securities in each sector.¹¹

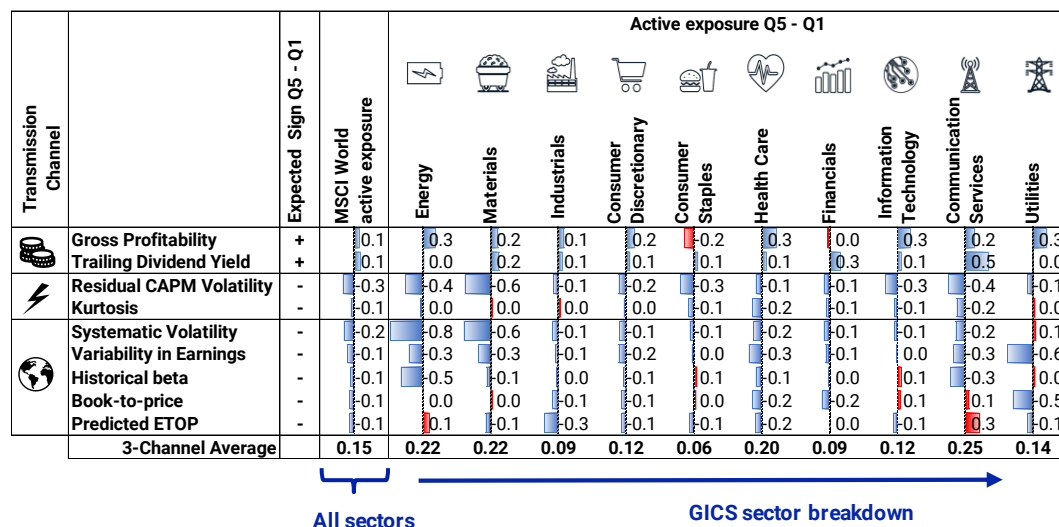
One challenge to this analysis is that the definition and even the number of GICS sectors changed during the study period. For instance, in September 2016, real estate was split from financials. Two years later, communication services were reclassified, resulting in companies moving from the information technology sector to the consumer discretionary sector. This study employed the GICS sectors since they were defined when each index rebalancing period started. However, we omitted the real estate sector from this analysis because it is a newly created sector.

Exhibit 9 and the related t-statistic (Exhibit A3) shows the variables for all three transmission channels on the left, followed by the results for the MSCI World Index and the 10 GICS sectors we studied.

¹⁰ By construction, the active exposures of each financial variable has a zero mean and standard deviation of one. Therefore, we can calculate the average difference of Q5 relative to Q1 quintiles across different financial variables as the simple average Q5-Q1 differences of active exposure.

¹¹ In general, the statistical confidence expressed by the t-statistic increases with the square root of the number of observations in the data sample. Therefore, we can expect the average t-statistics in GICS sectors to be $\sqrt{11} \approx 3.3$ times lower. The t-statistics of our analysis shown in Exhibit A3 in the Appendix confirm the aforementioned drop in average statistical confidence at a sector level.

Exhibit 9: Active Exposure of MSCI ESG Scores and Breakdown into GICS Sectors



Source: MSCI ESG Research LLC. Data from December 2006 to December 2019 for the MSCI World Index. We omitted the real estate sector because of its short history.

At a sectoral level, 77 of 99 tested quintile differences (Q5-Q1) showed the expected sign. The sectors showing the most significant results when considering the three-channel average were energy, materials, communications services and health care.

Considering individual financial variables, we saw that risk-related variables generally showed the most consistent overall results, with Q5 showing lower levels of residual risk across all sectors as Q5-Q1 data were less than or equal to zero.

The next step was to consider the E, S and G pillar breakdown by sector. We focused on three-channel averages of each pillar score in each GICS sector, as shown in Exhibit 10, to facilitate comparison. Overall, corporate governance (represented by the G score) showed the most significant and most average active exposure across all sectors and transmission channels. After the energy sector, governance was the biggest differentiator for the financial sector, which is intuitive, given its dependence on strong governance oversight, especially in areas such as risk and compliance.

Social and environmental risk management (represented by the E and S scores) were more important to some sectors than others. The E score was a significant differentiator in the materials, health care and energy sectors; the S score was significant mainly in the energy, utilities and communication services sectors.

Exhibit 10: Average Active Exposure of E, S and G pillar Scores across GICS Sectors



Source: MSCI ESG Research LLC. Data from December 2006 to December 2019 for the MSCI World Index. We omitted the real estate sector because of its short history.

The Appendix shows a detailed breakdown of each financial indicator across GICS sectors (Exhibit A5 to Exhibit A7).

Different pillars have higher scores in some sectors because each sector may be evaluated using different Key Issues, which are used in constructing each pillar score. For example, both the energy and health care sectors had high Environmental pillar scores. The Key Issues that contributed to the energy sector's E pillar score included carbon emissions, biodiversity and land use, and toxic emissions and waste (Exhibit 11). Only one Key Issue contributed to the health care industry's E pillar score: carbon emissions. Similarly, toxic emissions and waste was the only Key Issue for companies in the pharmaceutical and biotechnology industries.

Exhibit 11: Key Issues per GICS Sub-industry for Selected GICS Sectors

GICS Sector	GICS Sub-Industry Code	GICS Sub-Industry Name	Environmental										Social										Governance										
			Carbon Emissions	Product Carbon Footprint	Climate Change Vulnerability	Water Stress	Biodiversity & Land Use	Raw Material Sourcing	Financing Environmental Impact	Toxic Emissions & Waste	Packaging Material & Waste	Electronic Waste	Opportunities in Clean Tech	Opportunities in Green Building	Opportunities in Renewable Energy	Labor Management	Health & Safety	Human Capital Development	Supply Chain Labor Standards	Product Safety & Quality	Chemical Safety	Financial Product Safety	Privacy & Data Security	Insuring Health & Demographic Risk	Responsible Investment	Controversial Sourcing	Access to Communications	Access to Finance	Access to Health Care	Opportunities in Nutrition & Health	Corporate Governance	Corruption & Instability	Financial System Instability
Energy	10101010	Oil & Gas Drilling																															
	10101020	Oil & Gas Equipment & Services																															
	10102010	Integrated Oil & Gas																															
	10102020	Oil & Gas Exploration & Production																															
	10102030	Oil & Gas Refining & Marketing																															
	10102040	Oil & Gas Storage & Transportation																															
	10102050	Coal & Consumable Fuels																															
Materials	15101010	Commodity Chemicals																															
	15101020	Diversified Chemicals																															
	15101030	Fertilizers & Agricultural Chemicals																															
	15101040	Industrial Gases																															
	15101050	Specialty Chemicals																															
	15102010	Construction Materials																															
	15103010	Metal & Glass Containers																															
	15103020	Paper Packaging																															
	15104010	Aluminum																															
	15104020	Diversified Metals & Mining																															
	15104025	Copper																															
	15104030	Gold																															
	15104040	Precious Metals & Minerals																															
	15104045	Silver																															
	15104050	Steel																															
	15105010	Forest Products																															
	15105020	Paper Products																															
Health Care	35101020	Health Care Supplies																															
	35102010	Health Care Distributors																															
	35102015	Health Care Services																															
	35102020	Health Care Facilities																															
	35102030	Managed Health Care																															
	35103010	Health Care Technology																															
	35201010	Biotechnology																															
	35202010	Pharmaceuticals																															
	35203010	Life Sciences Tools & Services																															
Utilities	55101010	Electric Utilities																															
	55102010	Gas Utilities																															
	55103010	Multi-Utilities																															
	55104010	Water Utilities																															
	55105010	Independent Power Producers & Energy																															
	55105020	Renewable Electricity																															

Source: MSCI ESG Research LLC as of December 2019.

In our economic transmission analysis, we found that different issues were more germane to some industries than others. This economic transmission analysis focused on the short-term impact of ESG characteristics, as proxied by the Key Issues. In this analysis, Governance was the dominant pillar.

However, we found that the significance of the E, S and G pillars varied through different channels and timescales.

The S pillar showed more significant results for sectors such as energy and utilities. In those sectors, the underlying issues that contributed to the S pillar scores were related to workers' safety or labor relations. Moreover, the risk often materialized in the form of tangible events (like strikes or accidents). Such events may have resulted in a relatively short-term impact on profitability or stock price.

In contrast, results for the Social pillar looked weaker in sectors such as financials, where the underlying Key Issues used in the MSCI ESG Rating methodology were driven less by event and incident risks and more by longer-term trends, such as human capital management. The issues may not have shown strong short-term effects on profitability, stock-specific risk or systematic risk.

Likewise, the Environmental pillar showed significant results in the energy and materials sectors, where environmental risks emerged from events (accidents, oil spills). Such events may have had an immediate impact on corporate profitability or stock price. In contrast, the utilities sector (although intense in environmental impact) was not as prone to frequent moderate and severe events during the study period. This situation may be a consequence of the utilities sector being very heavily regulated and mature. The sector is bound by mandated environmental practices and could pass on associated capital expenditures to customers per regulations.

In general, the results suggest that financial markets largely focused on events that could immediately affect company valuations. This focus tended to affect the G pillar more than the E and S pillars, though the latter were affected by more tangible risks such as accidents, strikes or oil spills. The following section assesses how ESG indicators focus on the significance of *intangible* ESG characteristics over longer periods.

Financial Analysis of MSCI ESG Pillar Scores

To ascertain how much the improved profitability and risk profile has influenced companies' stock-price performance, we compared ESG indicators' top-performing Q5 and bottom-performing Q1 quintiles on two measures:

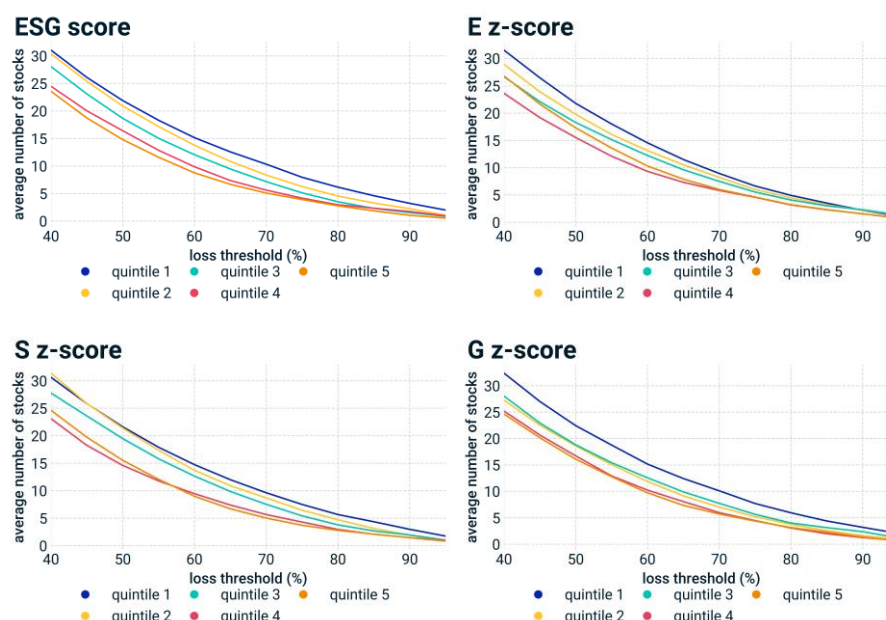
1. **Stock-price risk.** As stock-specific risk showed the most significant differentiation in Q5 and Q1, we considered stock drawdown frequencies as a measure of stock-specific risk. We employed a year-on-year analysis, as many risks are event-driven.
2. **Stock-price performance.** We analyze the total ESG score and individual E, S and G pillar scores for the entire 13-year period to better understand the performance drivers over time.

Stock-Price Risk of ESG Pillar Scores

Following Giese et al. (2019a), we employed stock-specific drawdown frequencies as a measure for stock-specific risk. We counted the number of companies that suffered a drawdown exceeding a given level every year during the three years following a rebalancing. We then compared their frequencies for Q5 and Q1 quintiles. We used size-adjusted quintiles to ensure that potential differences in risk were not due to differences in size.

Thus, Exhibit 12 shows that companies in the top-scoring quintile experienced fewer major drawdowns (ranging from 50% to 90% and measured from the time of the publication of the ESG score), as compared to the bottom-scoring quintile. This finding held for both the overall ESG scores and the individual pillar scores.

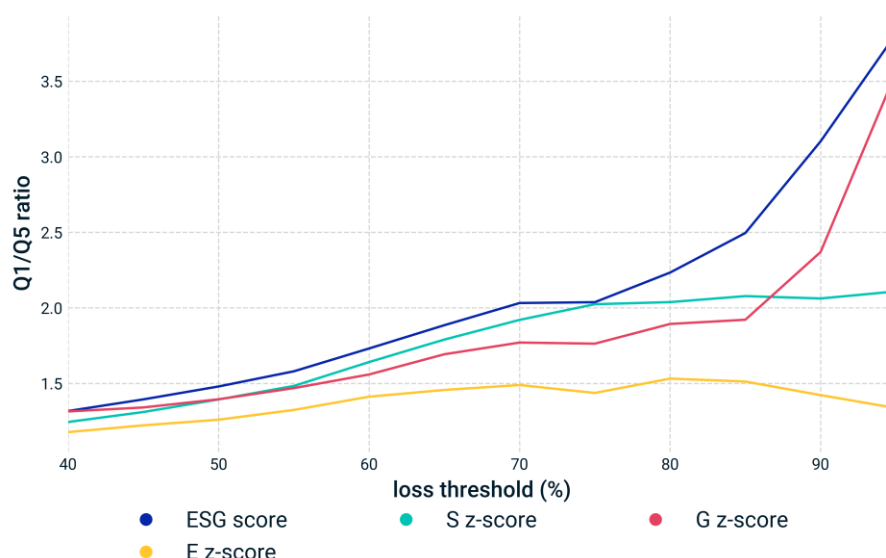
Exhibit 12: Frequency of Drawdowns in ESG and Pillar Quintile Portfolios



Source: MSCI ESG Research LLC. Data from December 2006 to December 2019 for the MSCI World Index.

Top- and bottom-quintile companies experienced the biggest difference in drawdown frequency at the tail. Thus, companies with strong ESG characteristics experienced fewer severe drawdowns than their peers with poor ESG characteristics (Exhibit 13). Hence, to better understand the differences between drawdown frequencies, we plotted the *ratio of drawdowns* observed in the Q1 quintile and Q5 quintile. The ratio tells us the differences in stock-specific risks between companies with low and high MSCI ESG Ratings, respectively.

Exhibit 13: Q1-to-Q5 Ratio of Drawdown Frequencies



Source: MSCI ESG Research LLC. Data from December 2006 to December 2019 for the MSCI World Index.

Among the three pillar scores, Governance showed the most significant variation in stock-specific risk, followed by the Social score and then the Environmental score. Why? Governance-related incidents such as ethics breaches impacted stock prices immediately. The Social pillar score contains some Key Issues for some sectors that also relate to event risks, such as health and safety or data privacy and security. These risks describe the risk of incidents that may affect the stock price, such as data breaches at Equifax¹² or Facebook. However, other Social pillar risks have surfaced more slowly, as we discuss shortly.

While some environmental risks such as toxic spills have been event-driven, the Key Issues that underlie the Environment pillar score include issues related to carbon emissions management that were not event-driven but may have affected companies' businesses over longer periods, such as those related to regulatory changes.¹³

We emphasize that the overall MSCI ESG score showed a Q1-to-Q5 drawdown frequency ratio that was close but slightly higher than the Governance score. Thus, while Governance was the main contributor to explaining stock-specific risks, the

¹² Nusca, A. "Equifax Stock Has Plunged 18.4% Since It Revealed Massive Breach." *Fortune*, Sept. 11, 2017.

¹³ For example, airlines face mandatory requirements to reduce fleet carbon intensity by 2026 through the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA).

industry-specific weighting scheme of Key Issue risk scores within the total MSCI ESG score led to a slight improvement in the Q1-to-Q5 ratio, as compared to using the G score alone. This observation suggests that it may have been helpful to capture incident-driven risk indicators such as health and safety that existed outside the G pillar in an ESG rating methodology.

Stock-Price Performance of E, S and G Pillar Scores

We now examine the performance drivers of the individual pillars over our 13-year study period. We created equal-weighted Q5 to Q1 quintiles (based on their scores) from the MSCI World Index to determine the total MSCI ESG score and each pillar score, subject to monthly rebalancing. Since institutional investors typically apply the overall ESG rating or score (or the underlying E, S and G pillar scores) in their investment process, we employed the standard industry-adjusted MSCI ESG score rather than underlying Key Issue components whose usage varies by sector. Similarly, we used E, S and G pillar scores in the z-score format per GICS sector to neutralize sectoral differences in the score distribution. Moreover, we constructed quintiles for MSCI North America, MSCI EMEA and MSCI Asia Pacific Indexes separately to control for regional differences (Giese et al., 2019b).

Exhibit 14 shows the stock performance difference of Q5-Q1 quintiles within the MSCI World Index. Further, Exhibit 15 shows the quintile performance figures for the subregions.

Exhibit 14: Performance of Q5-Q1 Quintile Portfolios in MSCI World Index (Local Currency)

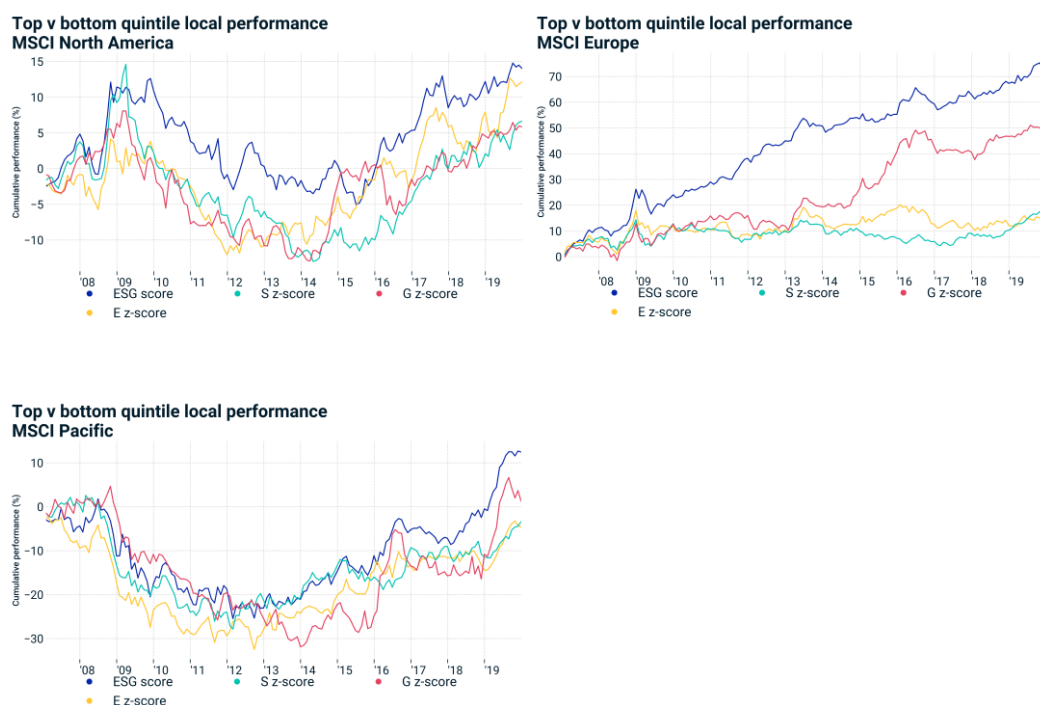


Source: MSCI ESG Research LLC. Data from December 2006 to December 2019 for the MSCI World Index. This exhibit shows how the top-performing quintile (Q5) minus the bottom-performing quintile (Q1) performed for the aggregate ESG score and each individual pillar score.

During our 13-year study period, all three pillars outperformed in the Q5-Q1 analysis. Contrary to the analysis of economic transmission channels in the previous section, the Social pillar score showed nearly the same positive results as the Environmental pillar. Furthermore, the total ESG score exceeded each individual pillar score. Moreover, it was the least cyclical.

Exhibit 15 extends the analysis to the three developed subregions of North America, Europe and Asia-Pacific. The combined ESG score was the top score in all three subregions. However, at a pillar-score level, there were regional differences: The Governance quintile portfolios performed better than the Environmental and Social quintile portfolios in Europe and Asia-Pacific, whereas Governance showed the lowest relative performance to benchmark in North America.

Exhibit 15: Performance of Q5-Q1 Quintile Portfolios in Subregions (Local Currency)



Source: MSCI ESG Research. Data from December 2006 to December 2019 for the MSCI World Index. This exhibit shows how the top-performing quintile (Q5) minus the bottom-performing quintile (Q1) performed for the aggregate ESG score and each individual pillar score for each region.

Considering the return versus risk profile in Exhibit 16, we see that the total ESG score was less cyclical than the individual pillar scores (as previously discussed). Moreover, the return/risk profile of the Q5-Q1 quintile portfolio provided higher-risk adjusted returns (return/volatility) than individual pillar scores in all three regions.

Exhibit 16: Performance and Risk Overview of Q5-Q1 Quintile Portfolios, in Local Currency

Region		ESG or pillar score			
		ESG	E	S	G
World	Return (%)	2.39	0.69	0.53	1.33
	Volatility (%)	3.20	2.98	2.79	3.80
	Return / volatility	0.75	0.23	0.19	0.35
North America	Return (%)	1.08	0.93	0.51	0.45
	Volatility (%)	4.57	4.48	4.76	4.28
	Return / volatility	0.24	0.21	0.11	0.11
Europe	Return (%)	5.67	1.16	1.18	4.07
	Volatility (%)	5.34	5.24	4.39	6.06
	Return / volatility	1.06	0.22	0.27	0.67
Pacific	Return (%)	0.96	-0.36	-0.26	0.10
	Volatility (%)	6.26	5.43	5.35	7.00
	Return / volatility	0.15	-0.07	-0.05	0.01

Source: MSCI ESG Research LLC. Data from December 2006 to December 2019 for the MSCI World Index. This exhibit shows how the top-performing quintile (Q5) minus the bottom-performing quintile (Q1) performed for the aggregate ESG score and each individual pillar score for the world and each region.

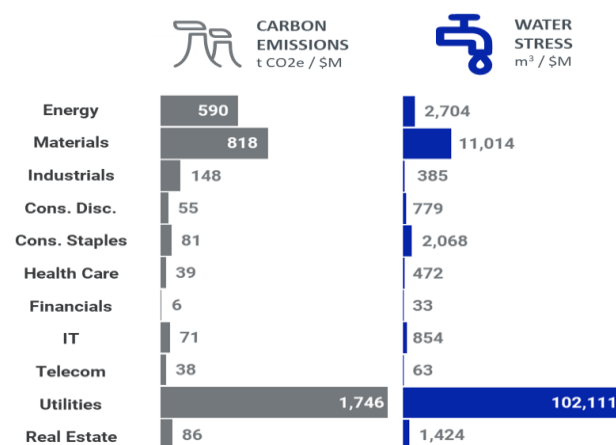
Thus, the whole was more than the sum of its parts. Aggregating Environmental, Social and Governance risk issues into a combined ESG score via an industry-specific pillar weighting scheme provided superior results than individual pillar scores during our 13-year study period.

Moreover, there is a clear difference between the previous analysis of economic transmission channels, which showed that the G score had the most significant financial relevance in all three transmission channels, and the stock-performance analysis, where performance differences between the three pillar scores were relatively small, and the aggregate ESG score provided the best results.

This observation may be due to differences in the underlying time horizon. The analysis of transmission channels considered the differences in profitability and risk profile of quintiles the year after the publication of ESG Ratings, as we were primarily focused on exposure to shorter-term event-driven risks. However, Exhibit 14 and Exhibit 15: Performance of Q5-Q1 Quintile Portfolios in Subregions (Local Currency) suggest that some financial effects of companies' ESG profile may have unfolded slowly over multiyear periods, which may not have materialized when using a year-on-year ESG quintile analysis.

This longer-term effect may be especially pertinent for environmental risks, where there is increasing public awareness of climate change. Thus, we examined GICS sectors where environmental risks, such as carbon emissions or water stress, carried a high weight in the E pillar score. The utilities and materials sectors were the sectors with the highest amount of carbon emissions and the second- and third-highest levels of water stress across all GICS sectors (Exhibit 17).

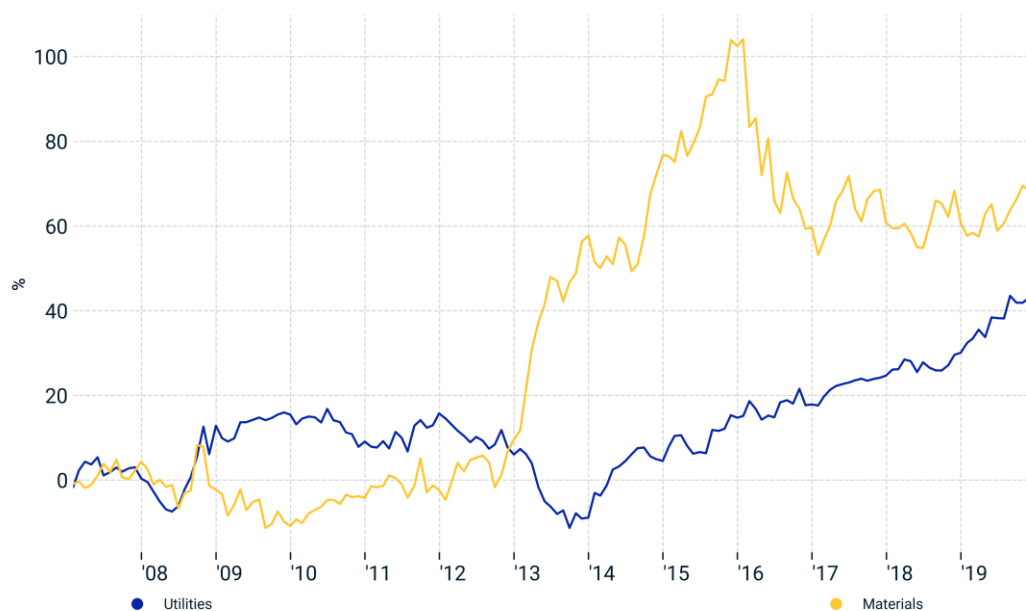
Exhibit 17: Carbon Emissions and Water Stress in GICS Sectors



Source: MSCI ESG Research LLC. Data as of December 2019. Carbon emissions and freshwater-withdrawal intensities based on reported data from a sample of 3,823 and 1,633 companies, respectively. Carbon emissions include scope-1 and scope-2 emissions.

We studied Q5 versus Q1 stock performance (in terms of “E”-quintiles) in these two sectors during the study period (Exhibit 18). In both sectors, stocks with high environmental scores outperformed low-scoring companies more than those in the underlying MSCI World Index over the 13-year study period. The long-term performance suggests that environmental risks may not have been visible in a relatively short-term risk analysis but may have had a considerable influence on stock performance over longer periods.

Exhibit 18: Cumulative Performance of Q5-Q1 'E'-Quintile Portfolios in Utilities and Materials (in Local Currency)



Source: MSCI ESG Research LLC. Data from December 2006 to December 2019 for the MSCI World Index.

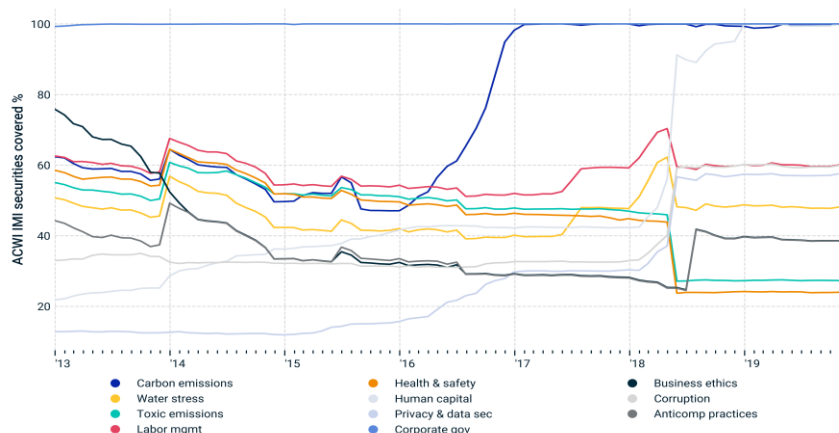
Part B: Economic Transmission Channels and ESG Key Issue Indicators

The above analysis identified significantly different levels of relevance for the E, S and G pillar scores as descriptors for risks across different GICS sectors. Thus, to explain the differences, this section examines the role played by the Key Issues that underpin the pillar scores in each industry. There are different sets of Key Issues employed in calculating each pillar score, and their number varies considerably. Some GICS sub-industries are exposed to as few as four underlying Key Issues, while other industries are exposed to as many as eight underlying Key Issues (see the Key Issue map in Exhibit 11). In MSCI's ESG Rating methodology, Key Issues are weighted and contribute to a company's E, S and G pillar scores (and overall ESG Rating) for the select industries that have high potential exposure to the respective issue.

The universe of Key Issues used within the MSCI ESG Rating model and the number of securities covered within the assessment has grown over time. To capture the longest data history and broadest universe of covered companies, the following analysis focuses on the 11 Key Issues most commonly used in calculating a company's ESG Rating:

- E pillar: carbon emissions, water stress, toxic emissions and waste
- S pillar: labor management, health and safety, human capital development and privacy and data security
- G pillar: corporate governance, business ethics, corruption and instability and anticompetitive practices

Exhibit 19 shows the universe of securities covered per Key Issue over time.

Exhibit 19: Key Risk Issues and History of Covered Securities within MSCI ACWI IMI


Source: MSCI ESG Research LLC. Period: 2013-2019, all covered securities within ACWI IMI.

To understand the relevance of certain Key Issues within MSCI's ESG Ratings methodology, Exhibit 20 shows the Key Issues with the largest weight per GICS sector. There are clear differences in the relative weighting of E, S and G Key Issues within the ESG Rating. For example, the utilities and materials sectors have had a high weight on environmental issues (toxic emissions and carbon emissions), while the financials and health care sectors have had a stronger focus on governance issues (e.g., corporate governance and corruption) and social issues (such as human capital).

Exhibit 20: Largest Weights of Key Issues in MSCI ESG Rating Model per GICS Sector

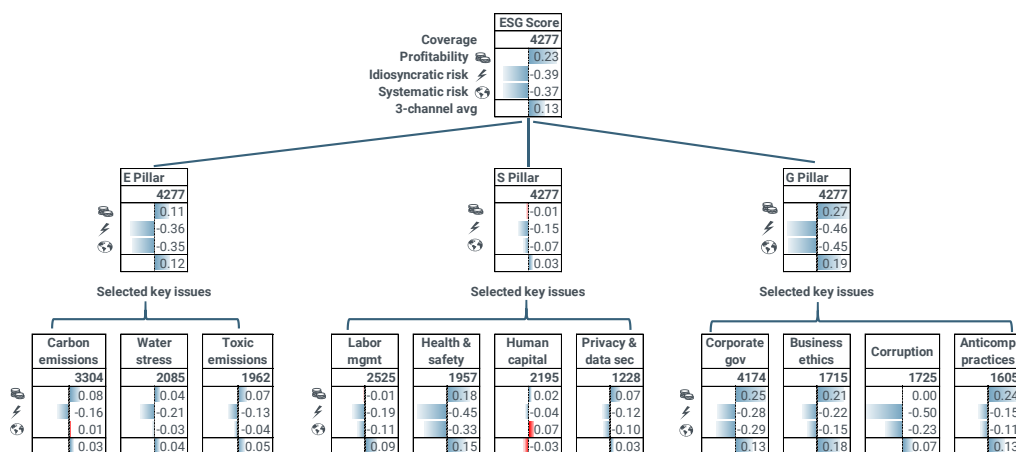
GICS Sector	1st weight	2nd weight	3rd weight
Energy	Health & safety 20.9%	Biodiv & land use 18.5%	Carbon emissions 18.4%
Materials	Toxic emissions 18.8%	Carbon emissions 14.2%	Corporate gov 12.0%
Industrials	Corporate gov 18.0%	Labor mgmt 15.8%	Corruption 15.0%
Consumer Discretionary	Corporate gov 17.7%	Labor mgmt 17.3%	Product safety 11.4%
Consumer Staples	Product safety 15.7%	Nutrition & health opps 14.0%	Corporate gov 12.3%
Health Care	Product safety 27.1%	Corruption 19.5%	Corporate gov 14.4%
Financials	Human capital 17.7%	Corporate gov 16.3%	Financial system inst 9.7%
Information Technology	Clean tech opps 19.0%	Corporate gov 18.3%	Human capital 18.3%
Communication Services	Privacy & data sec 21.8%	Corruption 20.7%	Labor mgmt 17.2%
Utilities	Carbon emissions 19.3%	Toxic emissions 14.2%	Water stress 13.5%
Real Estate	Green building opps 34.5%	Corporate gov 26.3%	Human capital 21.3%

Source: MSCI ESG Research. Environmental Key Issues (green), Social Key Issues (blue, Governance Key Issues (red).

As in the previous analysis of E, S and G pillar scores, we tested the financial relevance within the transmission channels. We size-adjusted the Key Issue scores using the same regression methodology in adjusting the E, S and G pillar scores (Exhibit A1). We employed profitability, residual volatility and systematic volatility as target variables to test the financial significance of each of the three transmission channels of profitability, idiosyncratic risk and systematic risk.

Exhibit 21 summarizes the empirical results in terms of active exposures of Key Issue score quintiles Q5 (highest-score quintile) relative to Q1 (lowest-score quintile). Exhibit 22 shows the corresponding t-statistics.

Exhibit 21: Key Issues and Active Exposure Q5-Q1



Source: MSCI ESG Research LLC. Period: 2013-2019, all covered securities within MSCI ACWI IMI.

Two findings support previously observed results at the pillar and the overall ESG Rating levels.

First, of the three transmission channels, the idiosyncratic risk channel showed the most significant empirical results across the 11 Key Issues tested, which is in line with the finding that idiosyncratic risk had the most significant empirical results at a total ESG score and pillar level (Exhibit 8). Moreover, it is typically related to event risks.

Furthermore, the Key Issues categorized under the Governance pillar showed, on average, the most significant empirical results across all three transmission channels, which is again in line with the findings at a pillar level (Exhibits 8 and 10). The corporate governance Key Issue had by far the most significant statistical confidence (the t-statistic exceeded six in all three transmission channels), which means that companies with strong corporate governance had significantly better

profitability, lower stock-specific risk and lower systemic risk than companies with low Governance levels during the study period.

In addition, the Social Key Issue health and safety showed significant empirical results (-0.45), especially in the stock-specific risk channel, which is in line with the economic intuition that companies with above-average safety measures were less likely to suffer stock-specific share-price shocks than companies with poor safety standards. More so, the labor management Key Issue score showed a reduction in stock-specific risk; meanwhile, it showed a slightly lower level of profitability.

Exhibit 22: Key Risk Issues and T-statistics

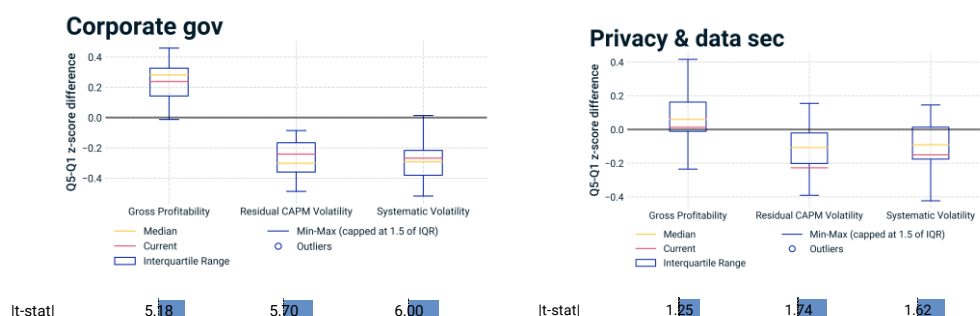
	Key issue t-statistics	Gross Profitability	Residual CAPM Volatility	Systematic Volatility
E	Carbon emissions	1.42	3.36	-2.29
	Water stress	0.78	3.39	1.83
	Toxic emissions	1.23	2.00	1.15
S	Labor mgmt	-0.58	3.06	1.95
	Health & safety	2.58	6.15	4.38
	Human capital	0.91	1.44	-2.04
G	Privacy & data sec	1.25	1.74	1.62
	Corporate gov	5.18	5.70	5.99
	Business ethics	2.78	2.98	1.97
	Corruption	-0.49	6.63	3.35
	Anticomp practices	3.15	1.94	1.42

Source: MSCI ESG Research LLC. Period: 2013-2019; all covered securities within MSCI ACWI IMI.

To illustrate how the transmission channels corresponded to selected key issues, we used two examples: privacy and data security and corporate governance (Exhibit 23). Privacy and data security had the fewest number of observations as relevant Key Issues (28% of companies in the MSCI ACWI IMI were covered on average). On the other hand, corporate governance is the only Key Issue that was relevant for 100% of covered companies. In both examples, the cross-sectional distribution of quintile differences (Q5-Q1) for the transmission channels aligned with the median values not only of the transmission channels but also for most companies within the study sample (i.e., the 25th to 75th percentiles shown).

Exhibit A8 shows all the Key Issue scores included in this study.

Exhibit 23: Strength of Transmission Channels to Corporate Governance and Privacy & Data Security



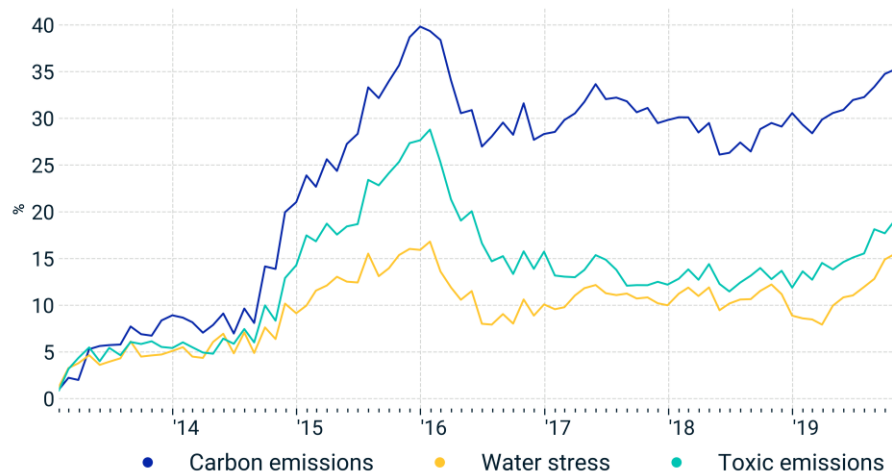
Source: MSCI ESG Research LLC. Period: 2013-2019; all covered securities within MSCI ACWI IMI. The plot shows median quintile difference (Q5-Q1) of key-issue z-scores (yellow line), the difference at the end of the study period (red line) and the interquartile range (IQR) defined as the range between the 25th percentile and 75th percentile (blue box) as well the minimum and maximum values capped at 1.5 times the IQR (blue lines). Circles indicate outliers. The t-stat within the universe of securities is shown at the bottom.

Performance of ESG Key Issue Indicators

We now turn to how quintiles of stocks based on different Key Issue scores performed. We use the same period and company sample as the analysis of Key Issues above to compare the stock-price performance of MSCI Industry-Adjusted ESG scores; E, S and G pillar scores; and Key Issue scores. We compare the stock-price performance of equal-weighted Q5 quintiles (long) versus equal-weighted Q1 quintiles (short) with monthly rebalancing. Exhibit 24 shows that the Q5 portfolios outperformed the Q1 portfolios for nine out of 11 Key Issues during the study period. It is interesting to note that carbon emissions showed the most significant outperformance of all Key Issues, with labor management within the Social pillar in second place.

Exhibit 24: Cumulative Q5-Q1 Quintile Performance, in Local Currency

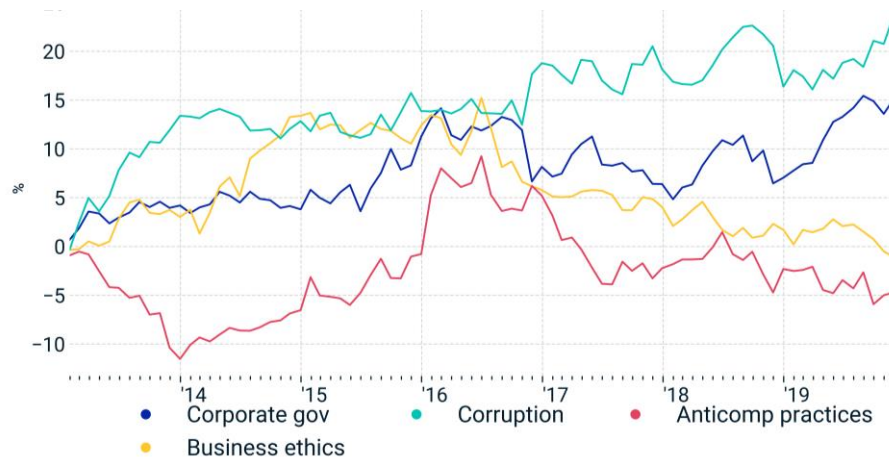
Environmental Key Issues



Social Key Issues



Governance Key Issues



Source: MSCI ESG Research LLC. Period: 2013-2019; all covered securities within MSCI ACWI IMI. This exhibit shows how the top-performing quintile (Q5) minus the bottom-performing quintile (Q1) performed for each pillar's underlying Key Issues.

In addition to considering absolute performance differentials, we employed the MSCI GEMLT model to understand the portion of the observed performance differentials that can be attributed to common factor exposures, as well as the residual performance effect, which we call the stock-specific performance (Exhibit 25).

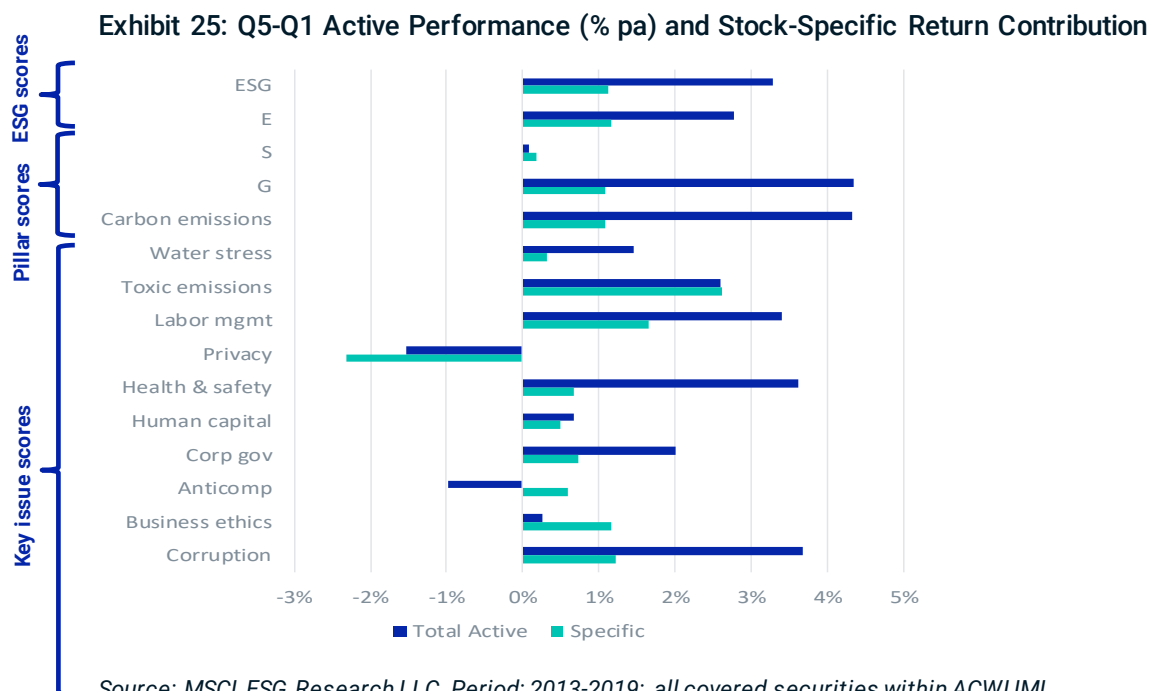


Exhibit 26 shows the details of the performance attribution, as well as the risk or return profile.

Exhibit 26: Q5-Q1 Total Active Performance in USD and Specific Contribution

	Total Active	Style	Industry	Country	Specific	Currency	Volatility	Return/risk
MSCI ESG score	3.3%	2.4%	0.3%	1.1%	1.1%	-1.7%	4.5%	0.73
E Pillar score	2.8%	2.4%	0.0%	0.5%	1.2%	-1.2%	4.4%	0.63
S Pillar score	0.1%	1.1%	-0.2%	0.0%	0.2%	-1.1%	2.9%	0.03
G Pillar score	4.3%	1.9%	0.5%	1.8%	1.1%	-0.9%	4.4%	0.98
Carbon emissions	4.3%	2.8%	1.2%	0.6%	1.1%	-1.4%	6.3%	0.68
Water stress	1.5%	2.2%	-0.3%	0.6%	0.3%	-1.3%	4.6%	0.31
Toxic emissions	2.6%	1.8%	-0.9%	0.5%	2.6%	-1.3%	5.2%	0.50
Labor mgmt	3.4%	1.3%	0.4%	0.8%	1.7%	-0.7%	3.5%	0.97
Privacy	-1.5%	1.0%	-0.1%	-0.4%	-2.3%	0.2%	4.9%	-0.31
Health & safety	3.6%	3.3%	0.1%	1.3%	0.7%	-1.7%	5.2%	0.69
Human capital	0.7%	1.1%	0.4%	-0.7%	0.5%	-0.6%	5.0%	0.14
Corp gov	2.0%	1.2%	-0.6%	1.6%	0.7%	-0.9%	4.5%	0.45
Anticomp	-1.0%	-0.6%	-0.4%	-0.1%	0.6%	-0.5%	5.8%	-0.17
Business ethics	0.3%	0.4%	-1.5%	0.0%	1.2%	0.1%	4.8%	0.05
Corruption	3.7%	2.7%	-1.0%	1.8%	1.2%	-1.1%	5.6%	0.66

Source: MSCI ESG Research LLC. Period: 2013-2019; all covered securities within MSCI ACWI IMI.

We found that the Q5 quintile of MSCI Industry-Adjusted ESG scores outperformed the Q1 quintile by 3.3% annually in absolute terms and by 1.1% annually in terms of specific performance contribution (i.e., after controlling for other factors). This finding is in line with Giese et al. (2019a), who compared the Q5 versus Q1 performance for the longer study period of 2006 to 2017 but on a smaller universe of stocks (the MSCI World Index).

Moreover, the analysis showed that the E and G pillar scores added about 1% annualized performance during the study period, while the S pillar score was performance-neutral.

Considering performance at the Key Issue indicator level, we observe that 10 out of 11 Key Issues tested showed a positive specific performance contribution, with only privacy and data security showing a negative result. Of the 11 Key Issues, seven showed a specific performance contribution of at least 1% per year. On average, Key Issues categorized under the Governance pillar of the MSCI ESG Rating model showed the highest average positive specific performance contribution. This finding is consistent with our earlier analysis of economic transmission channels, thus showing that governance-related Key Issues showed the greatest improvement in profitability and risk-related descriptors.

Furthermore, the total active return exceeded the specific return for the majority of E, S and G Key Issue indicators tested, which is mainly due to the positive contribution from equity style factors.¹⁴

The overall ESG score as well as the Environmental pillar score showed a positive correlation with quality factors (i.e., higher investment quality, higher profitability, better earnings quality, lower leverage and lower earnings variability). This finding is in line with the previous section, where the top quintile of ESG indicators showed higher levels of profitability with lower levels of risk. In addition, we observed a large-cap bias except for the G score, which was size-neutral. These correlations between ESG indicators and style factors may explain the performance contribution from styles in Exhibit 27.

¹⁴ Exhibit 3 explores the correlation between E, S and G scores and GEMLT style factors.

Part C: The Role of Weights in Creating an ESG Score

MSCI ESG Research's ESG Rating methodology is based on an industry-specific selection of Key Issues and an industry-specific weighting of those issues to calculate the overall MSCI ESG Rating. However, to what extent has the weighting scheme contributed to the findings that the ESG Rating and E, S and G pillar scores have shown financial relevance?

MSCI ESG Research's ESG Rating model employs an industry-specific weighting scheme that is recalibrated annually and prospectively through a systematic, rules-based process.¹⁵ Some investors may be tempted to use quantitative analysis to determine the weighting scheme of an ESG rating model in the desire to improve the strength of financial significance. On the one hand, using quantitative analysis "lets the data speak" in identifying ESG indicators that have shown financial significance historically. Moreover, it could potentially identify and remove or minimize indicators that have not improved the financial relevance of the score.

On the other hand, there is the risk of data mining an ESG rating model that maximizes the financial significance within the given historical dataset. One bears the risk that such backtested results may not deliver similar results in the long run, as ESG risks are dynamic and evolving (more so than for traditional metrics, such as style factors). For example, extreme weather events and water scarcity could become more financially relevant in the next two decades than in the past two. Similarly, consumer concerns and regulatory risk related to privacy protection was very nascent and likely not as financially relevant 10 years ago.

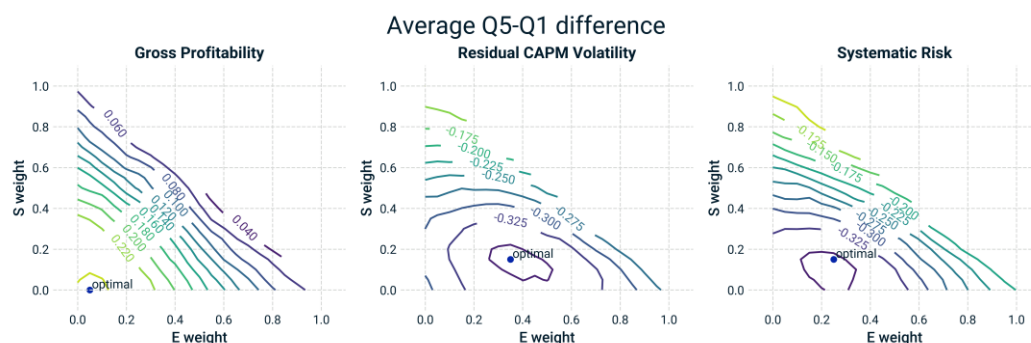
The risk of data mining typically increases with the number of parameters one can use to calibrate a model to a specific dataset. For instance, one could use an optimizer to determine the relative weighting of E, S and G pillar scores to maximize the statistical reliability of the Q5-Q1 differences in the financial variables employed. If the optimizer employed two values that may vary and adjusted the weightings annually, it would have resulted in 26 values (or free optimization parameters) for our 13-year study period. Using sector- or industry-specific optimization would multiply the dimensions accordingly. Optimization at a Key Issue level would multiply the number of values even more.

Despite the risks of data mining, it can be instructive to see how reweighting ESG pillar scores might have affected the financial relevance found in the previous analysis.

¹⁵ MSCI ESG Ratings Methodology. See also 2020 ESG Ratings Model Consultation. MSCI ESG Research's annual consultation solicits feedback from its institutional-investor clients on proposals to enhance the ratings methodology and recalibrate industry-specific inputs.

To mitigate the risk of data mining, we limited the number of free optimization parameters to time-independent weights for the E, S and G pillar scores during the study period. Then we considered constant E, S and G weights across sectors. Exhibit 27 illustrates how the Q5-Q1 differences in profitability and risk changed as a function of the chosen E, S and G pillar weights.

Exhibit 27: Backward-Optimization of ESG Pillar Weights













Source: MSCI ESG Research LLC. The charts exemplify the Q5-Q1 differences for profitability, residual volatility and systematic volatility as a function of pillar weights. Data are from December 2006 to December 2019 for the MSCI World Index.

Our results show that for each transmission channel, the largest Q5-Q1 difference resulted in putting the heaviest weight on the Governance pillar and the lightest weight on the Social pillar, which is in line with our earlier observations about the strength of the pillars.

Next, we turned to a target variable that is the average of the three financial variables. We also allowed pillar weights to be sector-dependent. Exhibit 28 shows the results of a sector-specific optimization, where the optimizer chose the relative pillar weights to maximize the three-channel average difference during the study period. While the average relative weights were in line with our previous results, showing that Governance had the highest level of financial relevance (a 48% sector average weight) and Social the lowest (a 23% sector average weight), there were significant sectoral differences. In the financial sector, practically all the weight was assigned to Governance, while in the materials sector, almost all the weight was assigned to the Environmental pillar through the optimization process.




Exhibit 28: Sector-Specific Optimization of E, S and G Weights

											Sector average
	Energy	Materials	Industrial	Consumer Discretionary	Consumer Staples	Health Care	Financials	Information Technology	Telecom	Utilities	
Environmental	10	80	10	0	30	75	10	40	45	0	29
Social	85	0	15	30	5	0	0	0	15	90	23
Governance	5	20	75	70	65	25	90	60	40	10	48

Source: MSCI ESG Research LLC. Data from December 2006 to December 2019 for the MSCI World Index. We omitted the real estate sector because of its short history.

To avoid data mining and consider all three transmission channels, we used the optimal weights that were 1) not sector-dependent and 2) maximized the Q5-Q1 difference in the three-channel average score. This method led to 25%, 5% and 70% weighting of the E, S and G pillars, respectively. Next, we compared the financial relevance of the optimized ESG weighting scheme to equally weighting the three pillars. Exhibit 29 summarizes the results.

Exhibit 29: Analysis (T-statistic) of Alternatively Weighted ESG Ratings

Transmission Channel		Expected sign Q5 - Q1	t statistic					Eq Wgt z-score	Optimized weights
			MSCI ESG score	E z-score	S z-score	G z-score			
	Gross Profitability	+	1.55	0.81	1.35	2.76		1.74	2.61
	Trailing Dividend Yield	+	1.64	1.43	0.97	1.49		1.64	1.55
	Residual CAPM Volatility	-	3.01	3.08	1.61	3.37		3.74	3.92
	Kurtosis	-	1.04	1.20	0.95	1.17		1.19	1.23
	Systematic Volatility	-	2.67	2.76	1.68	3.80		3.33	4.08
	Variability in Earnings	-	1.94	1.54	1.80	2.04		2.29	2.14
	Historical beta	-	1.43	1.56	1.29	2.22		1.16	1.72
	Book-to-price	-	1.72	1.61	0.81	2.66		2.08	2.83
	Predicted ETOP	-	1.31	0.98	1.14	0.79		1.06	0.82
3-Channel Average			1.81	1.44	1.26	2.23		2.05	2.32

Existing total ESG
and pillar scores

Alternatively
weighted ESG scores

Source: MSCI ESG Research LLC. Data from December 2006 to December 2019 for the MSCI World Index.

We can evaluate the impact of adding E and S key indicators in the three weighting approaches. The equal-weighting approach ranked slightly behind the stand-alone G score in terms of historical relevance. This finding implies that adding E and S Key Issue indicators to the overall ESG score in a uniform or mechanical way across sectors effectively decreased the financial significance of the overall score.

In contrast, the optimized weighting showed more significant financial relevance than the stand-alone G score. Adding environmental and social risk indicators to the ESG scoring process improved the score during our study period. However, an approach that annually optimizes the portfolio may be backward-looking and may underestimate the weights of ESG indicators that impact financial results over longer periods. This result explains why the Governance pillar score showed the highest level of financial relevance during our 13-year study period. Governance-related risks or incidents may have had a more immediate impact on equity prices than certain Social issues (such as companies' management of human capital) or Environmental issues (such as the carbon efficiency of companies). The latter may have influenced the fundamentals of corporates and their stock price over longer periods, as illustrated in the previous section that analyzed longer-term stock performance.

Therefore, one must be cautious when using financial analysis to calibrate an ESG rating methodology. Apart from the risk of data mining, backward-optimization may underestimate the importance of ESG indicators that may affect financial results over longer periods. Moreover, it may underestimate the importance of ESG indicators that have not had a financial impact in the past but may be financially significant in the future. At the pillar level, the E and S pillars showed a higher degree of financial relevance in a multiyear performance analysis than in the year-on-year quintile analysis of economic transmission channels. At the Key Issue level, carbon emissions stood out as the Key Issue that showed the most significant stock performance impact over the full study period, while the immediate impact on the risk and profitability of companies proved to be less relevant than the influence of corporate governance indicators.

An analysis of the actual financial performance of using these alternatively weighted ESG scores in Exhibit 30 shows that neither the simple equal-weighted approach or the backward-optimization approach would have correlated to better stock performance or lower levels of risk during our study period. **Rather, the actual overall MSCI ESG scores – constructed using a systematic, prospective recalibration of the Key Issues and weights in the ESG Ratings model – showed a better Q5-Q1 performance difference and a lower level of cyclical.**

Exhibit 30: Performance of Q5-Q1 Quintile Portfolios (in Local Currency)



Source: MSCI ESG Research LLC. Data from December 2006 to December 2019 for the MSCI World Index. Comparison of MSCI ESG Industry-Adjusted scores, equal-pillar-weighted scores and optimized ESG scores.

Conclusion

ESG strategies are typically based on some type of ESG rating approach. However, what indicators support that approach? First, there are individual E, S and G pillar scores. Within MSCI ESG Research's methodology, Key Issues scores underpin MSCI ESG Ratings. We tested these ESG indicators by considering their economic transmission channels to financial variables and long-term stock performance.

Within our analysis of economic transmission channels, the top quintiles showed higher profitability and lower levels of idiosyncratic and stock-specific risk than the bottom quintile for the majority of ESG pillar and Key Issue indicators. Governance indicators showed the most significant financial significance at a pillar and Key Issue level. On a sectoral level, the telecom, materials and energy sectors showed the most significant results. Consumer staples showed the lowest level of financial relevance.

However, when analyzing long-term stock performance, overall E, S and G pillar scores and 10 of 11 Key Issue scores showed better results, with more uniform results across E, S and G indicators than in the analysis of transmission channels.

One explanation is that different ESG indicators affected financial variables over different time horizons. Some governance-related risks immediately impacted stock prices and thus showed higher levels of statistical confidence when considering volatility or frequency of large drawdowns. However, some environmental or social indicators have developed slowly but have had long-lasting financial effects. For example, the carbon emissions Key Issue score showed strong long-term results, though it was less relevant than governance indicators based on short-term criteria.

When using ESG ratings that focus on financially relevant risks, we found that it is important to consider the time horizon. If the focus of the ESG rating is to measure risks that can impact a company's share price in the short term, then governance indicators would have been given the highest weight during our study period. Indeed, our short-term-oriented analysis would have given governance at least 50% of the weight.

However, when considering financial performance over longer periods, we found that the MSCI ESG Rating that was based on a more balanced and industry-specific weighting showed better long-term relevance than the individual pillar indicators, including the Governance score.

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Appendix

Size-Adjustment Calculation

Exhibit A1: Size Adjustment of ESG Descriptors

Calculation process

Regarding the MSCI ESG scores as well as E, S, and G pillar scores and underlying Key Issue scores, we neutralized the observed positive correlation to size by using the following regression process:

Let S_{it} denote the ESG descriptor of company i at time t to be size-neutralized, and let $Mcap_{it}$ denote its market capitalization in USD at time t .

Then, for every year t in our study period, we estimate a linear regression model across the benchmark universe of companies B_t of the following form:

$$S_{it} = a_t + b_t \log(Mcap_{it}) + \varepsilon_{it} \quad \forall i \in B_t.$$

The monthly regression coefficients a_t and b_t are estimated using a least-squares methodology. The coefficient b_t indicates the degree of size bias in the ESG descriptor at time t .




Definition of size-adjusted descriptors

From the construction, the company-specific residuals ε_{it} of the regression show no correlation to the size of companies in the benchmark universe. Therefore, we employed these residuals as size-adjusted ESG-descriptors \tilde{S}_{it} :

$$\tilde{S}_{it} = \varepsilon_{it} \quad \forall t, i \in B_t$$

Detailed Pillar Breakdown Across GICS Sectors














Exhibit A2: T-statistic of Q5-Q1 Quintiles Including Pillar Breakdown

Transmission Channel		Expected sign Q5 - Q1	t statistic			
			MSCI ESG score	E z-score	S z-score	G z-score
	Gross Profitability	+	1.55	0.81	1.35	2.76
	Trailing Dividend Yield	+	1.64	1.43	0.97	1.49
	Residual CAPM Volatility	-	3.01	3.08	1.61	3.37
	Kurtosis	-	1.04	1.20	0.95	1.17
	Systematic Volatility	-	2.67	2.76	1.68	3.80
	Variability in Earnings	-	1.94	1.54	1.80	2.04
	Historical beta	-	1.43	-1.56	1.29	2.22
	Book-to-price	-	1.72	1.61	0.81	2.66
	Predicted ETOP	-	1.31	0.98	1.14	0.79
3-Channel Average			1.81	1.44	1.26	2.23

Top-level ESG
ESG Pillar break-down

Source: MSCI ESG Research LLC. Data from December 2006 to December 2019 for the MSCI World Index.

Exhibit A3: T-statistic of Q5-Q1 Quintiles and Breakdown into GICS Sectors

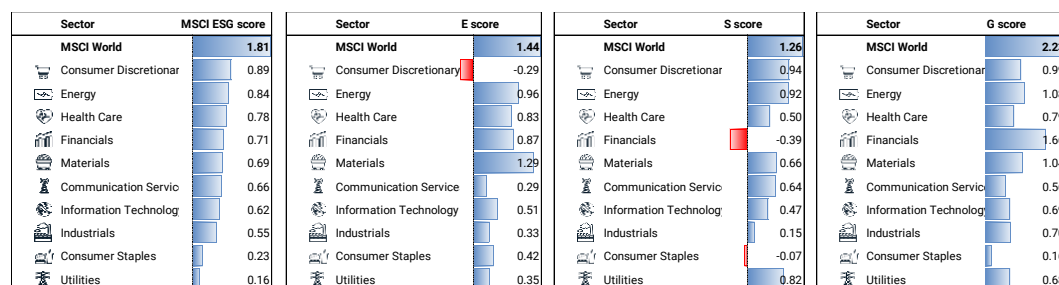
Transmission Channel		Expected Sign Q5 - Q1	MSCI World	t statistic										
				 Energy	 Materials	 Industrials	 Consumer Discretionary	 Consumer Staples	 Health Care	 Financials	 Information Technology	 Communication Services	 Utilities	
	Gross Profitability	+	1.5	0.9	0.6	0.6	1.0	-1.2	1.1	-0.5	1.1	0.6	0.9	
	Trailing Dividend Yield	+	1.6	0.7	0.8	0.6	0.6	0.6	0.5	1.4	0.5	1.2	-0.8	
	Residual CAPM Volatility	-	3.0	1.2	2.1	0.9	0.8	1.0	0.6	1.0	1.0	0.8	0.6	
	Kurtosis	-	1.0	0.8	-0.7	-0.7	0.9	0.8	0.9	0.8	0.9	0.8	-0.6	
	Systematic Volatility	-	2.7	2.3	2.1	0.9	0.9	0.6	0.7	1.1	0.5	0.8	-0.6	
	Variability in Earnings	-	1.9	1.0	1.0	1.0	1.0	0.5	1.0	0.8	0.6	0.8	1.8	
	Historical beta	-	1.4	1.5	0.7	0.8	0.7	-0.8	0.6	0.9	-0.5	1.1	-0.9	
	Book-to-price	-	1.7	-0.6	-1.1	0.8	1.2	-0.5	0.7	1.6	-0.4	-0.6	1.3	
	Predicted ETOP	-	1.3	-0.8	0.6	1.5	1.2	0.5	0.9	-0.6	0.5	-0.7	0.7	
3-Channel Average			1.81	0.84	0.69	0.55	0.89	0.23	0.78	0.71	0.62	0.66	0.16	

All sectors

GICS sector breakdown

Source: MSCI ESG Research LLC. Data from December 2006 to December 2019 for the MSCI World universe. We omitted the real estate sector because of its short history.

Exhibit A4: T-statistic of E, S and G Pillar Scores Across GICS Sectors



Source: MSCI ESG Research LLC. Data from December 2006 to December 2019 for the MSCI World Index. We omitted the real estate sector because of its short history.

Exhibit A5: T-statistic of Environmental Score Across GICS Sectors

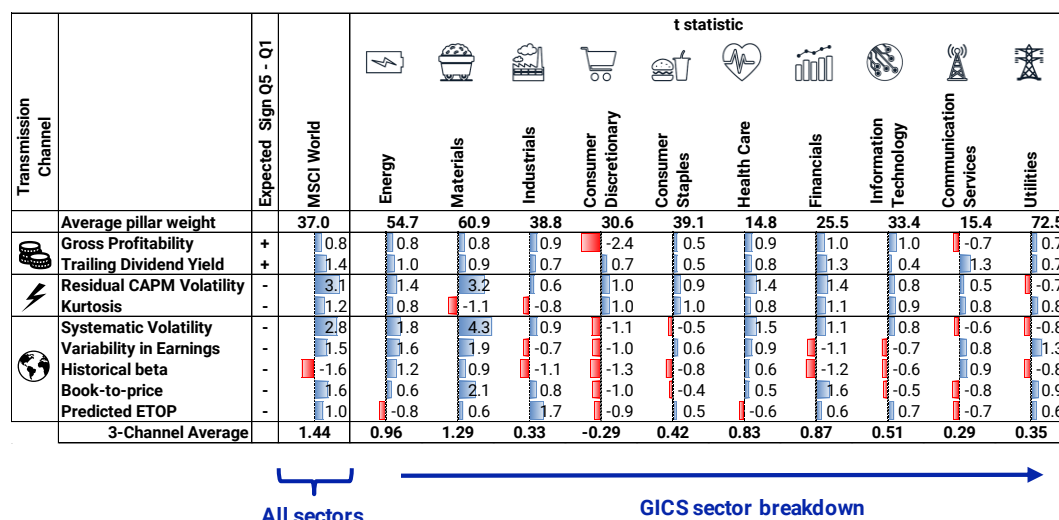


Exhibit A6: T-statistic of Social Score Across GICS Sectors





























Transmission Channel		Expected Sign Q 5 - Q 1	MSCI World	t statistic										
														
	Average pillar weight		40.7	22.6	24.5	34.9	48.3	46.7	53.9	49.7	47.4	50.7	16.3	
	Gross Profitability	+	1.3	0.9	-0.5	-0.6	1.3	-1.1	0.9	-1.0	1.0	0.7	0.9	
	Trailing Dividend Yield	+	1.0	1.1	0.6	0.6	0.6	-0.8	-0.7	1.3	0.9	1.2	0.5	
	Residual CAPM Volatility	-	1.6	1.6	1.8	0.6	0.8	0.5	0.5	-0.9	0.7	0.6	1.0	
	Kurtosis	-	1.0	-0.8	0.8	-0.7	0.9	0.7	0.7	1.0	0.7	0.7	0.7	
	Systematic Volatility	-	1.7	3.3	2.1	0.6	0.8	-0.4	0.5	-1.8	-1.2	0.8	0.7	
	Variability in Earnings	-	1.8	1.8	0.8	0.7	1.2	0.6	0.8	-1.1	0.6	0.9	1.6	
	Historical beta	-	1.3	2.0	1.1	0.7	0.8	-0.6	0.6	-1.5	-0.9	1.0	0.7	
	Book-to-price	-	0.8	0.6	-1.3	-0.7	1.2	0.4	0.8	-1.3	-0.5	-0.5	1.3	
	Predicted ETOP	-	1.1	-1.1	0.5	1.2	1.2	0.8	1.2	-1.1	0.7	-0.6	0.7	
3-Channel Average			1.26	0.92	0.66	0.15	0.94	-0.07	0.50	-0.39	0.47	0.64	0.82	
														
			All sectors				GICS sector breakdown							

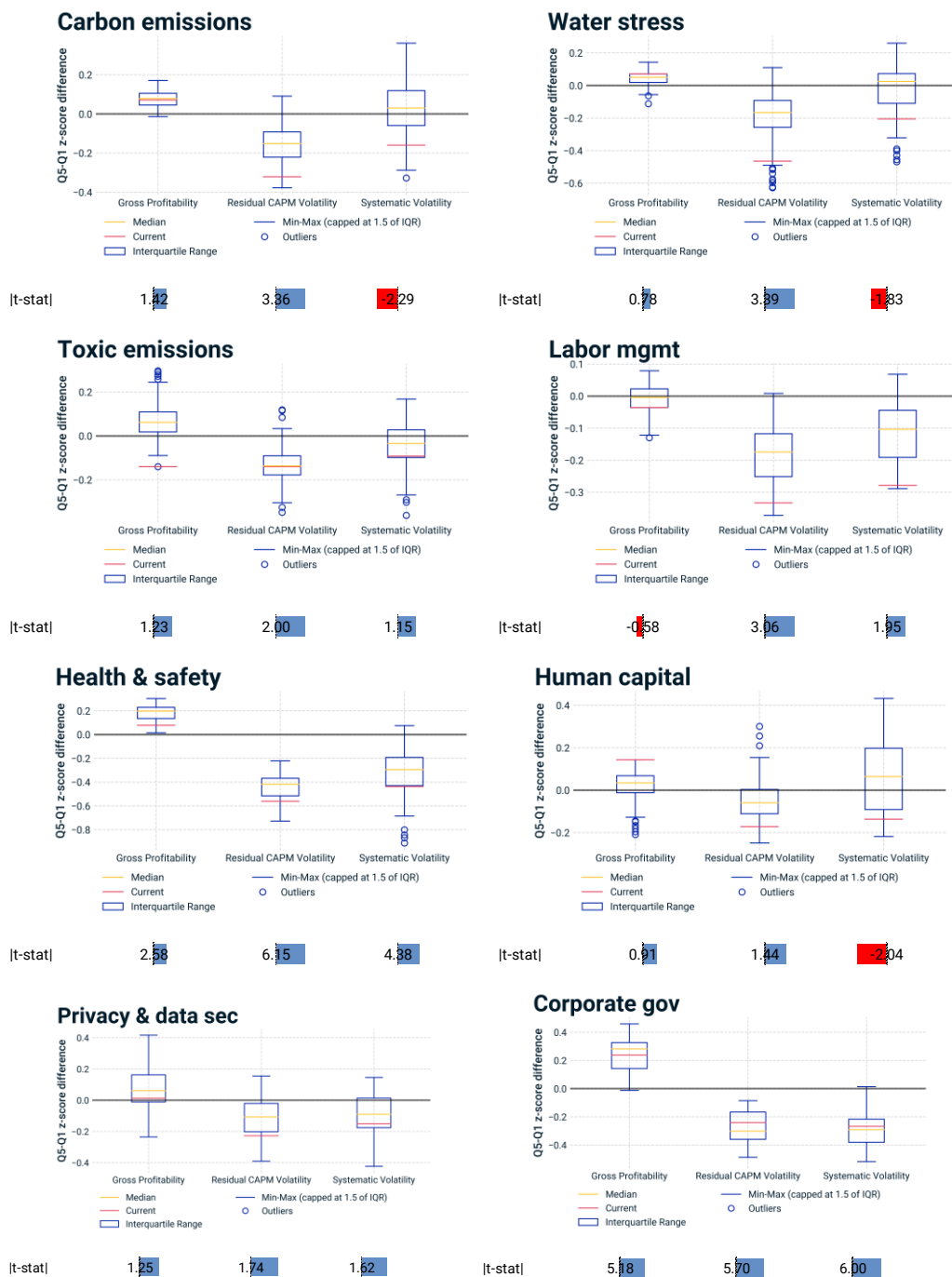
Exhibit A7: T-statistic of Governance Score across GICS Sectors

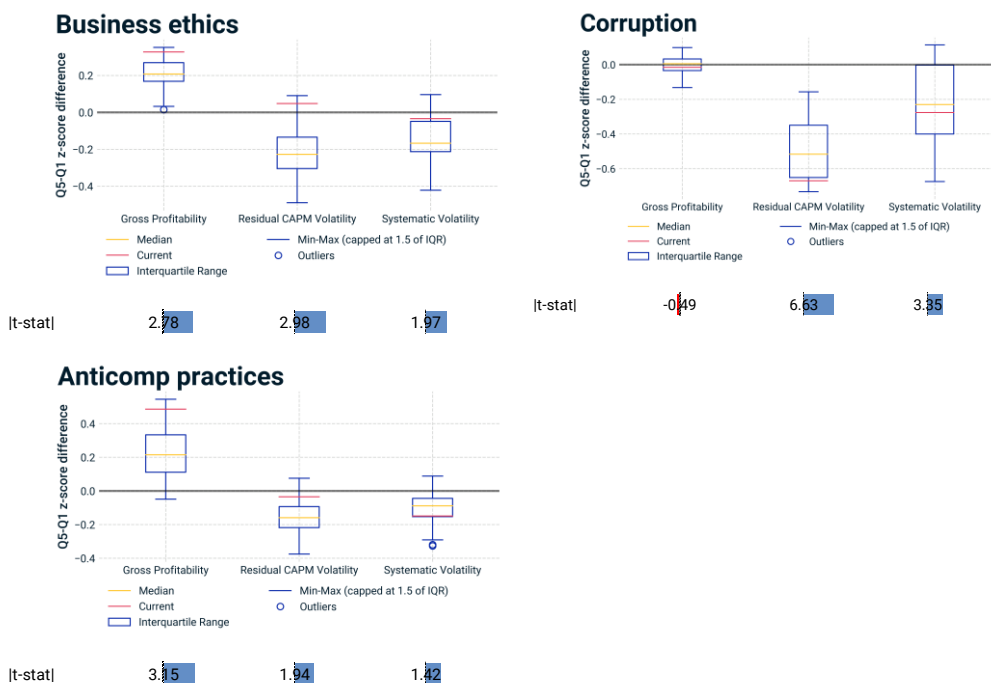
Transmission Channel		Expected Sign Q 5 - Q 1	MSCI World	t statistic										
														
	Average pillar weight		22.3	22.7	14.6	26.3	21.2	14.2	31.3	24.8	19.3	33.9	11.3	
	Gross Profitability	+	2.8	1.1	0.7	1.5	2.3	-0.9	1.3	1.2	1.3	0.6	0.3	
	Trailing Dividend Yield	+	1.5	1.1	0.8	0.5	0.8	0.5	0.8	1.6	-0.6	0.6	0.5	
	Residual CAPM Volatility	-	3.4	1.0	1.9	1.3	1.2	0.9	1.1	1.9	1.0	0.8	0.9	
	Kurtosis	-	1.2	0.7	0.8	-0.9	-1.1	0.8	0.8	1.1	1.0	0.8	0.8	
	Systematic Volatility	-	3.8	1.8	2.3	1.0	1.6	0.6	0.9	3.0	0.9	0.7	0.7	
	Variability in Earnings	-	2.0	1.5	1.0	1.0	1.5	-0.4	0.8	1.2	0.7	0.9	0.9	
	Historical beta	-	2.2	1.6	1.0	0.5	1.3	-0.8	0.7	2.3	0.7	0.9	0.7	
	Book-to-price	-	2.7	0.7	1.2	0.9	1.6	0.5	0.5	3.0	0.6	-0.5	1.0	
	Predicted ETOP	-	0.8	0.7	-0.5	1.0	0.9	-0.6	-0.8	0.9	0.5	-0.5	0.6	
3-Channel Average			2.23	1.08	1.04	0.70	0.99	0.16	0.79	1.66	0.69	0.56	0.68	
														
				All sectors				GICS sector breakdown						

Data from December 2006 to December 2019 for the MSCI World Index. We omitted the real estate sector because of its short history.

Detailed Key Issue Breakdown by Transmission Channel

Exhibit A8: Results Within the Universe of Companies





Source: MSCI ESG Research LLC. Period: 2013-2019; all covered securities within the ACWI Investable Market Index (IMI). The plot shows the median quintile difference Q5-Q1 of key-issue z-scores (yellow line), the difference at the end of the study period (red line) and the interquartile range (IQR) defined as the range between the 25th sectional percentile and 75th cross-sectional percentile (blue box), and the winsorized minimum and maximum range from $Q1 - 1.5 * IQR$ to $Q3 + 1.5 * IQR$ (blue lines). The circle indicates outliers. The t-stat within the universe of securities is shown at the bottom.

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