Comparing Risk and Performance for Absolute and Relative ESG Scores

An Empirical Analysis Using MSCI ESG Scores

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Executive Summary

ESG investing is undergoing a pivotal shift. Investors are increasingly moving away from asking "if" ESG can add value to their strategies, and towards questions of "how" and "where." Supported by a growing body of research, the underlying dynamics between ESG scores and financial performance are becoming clearer. In recent work, we teased apart component environmental, social and governance scores to better highlight differences in how they correlate with financial performance.[1] In this paper, we continue the arc of investigation and turn the spotlight on two ESG score types contained within the MSCI ESG letter rating — specifically the absolute (weighted average key issue score) and industry-relative scores (industry-adjusted score).

The industry-relative score provides a "best in class" approach while the absolute score offers an aggregated view of a company's total potential risks but may not differentiate as well between members of the same industry. As investors debate which type of signal may serve them best, we wanted to test how these different ESG signals correlated with financial performance.

A fundamental analysis showed that both scores correlated with higher profitability characteristics and lower levels of idiosyncratic and stock-specific risk. The industry-relative score had a stronger correlation with factors linked to cash-flow, including gross profitability. The absolute score was more useful for differentiating companies' exposure to idiosyncratic risk. Given the latter result, we further tested how our two ESG scores correlated with downside risk — both in stock-price drawdown events (equity) and spikes in option-adjusted spreads (fixed income).

Controlling for industry-specific risk may have allowed the industry-relative score to better reflect companies' competitiveness versus their peers and therefore profitability characteristics — potentially making it more useful for stock selection purposes. By contrast, the absolute score's aggregation of underlying ESG risks offered greater correlation with downside risks — potentially making it more useful for sector allocations or fixed income investors. The results from our fixed income analysis are preliminary and point to intriguing areas for further investigation. More broadly, this work offers a demonstration of how different investment priorities may benefit from a more precise application of ESG scores.

The authors thank Karun Jacob for his contributions to this research.

[1] Giese, G., Z. Nagy and L.-E. Lee. 2020. "Deconstructing ESG Ratings Performance: Risk and Return for E, S and G by Time Horizon, Sector and Weighting." MSCI.

Introduction

ESG scores and ratings have become more widely used in recent years by institutional investors as part of their investment process.[2] While prior research, including from Friede et al. (2015),[3] sought to test for correlations between ESG ratings and financial performance, some more recent research has aimed to investigate how the nature of ESG risks can manifest differently in risk and performance measures across types of ESG issues, sectors and time periods.[4]

An important tenet of integrating ESG factors with the objective of improving risk-adjusted returns is to incorporate only those ESG issues that are financially relevant for a company and industry.[5] Because vastly different ESG issues could be financially material for different industries, comparing or ranking companies' ESG performance within their industry enables better apples-to-apples comparison than ranking companies across industries whose scores reflect aggregation of different underlying ESG issues. This has typically been referred to among practitioners as a "best in class" approach and is better suited as a tool for security selection than for sector allocation since it assumes sector-neutrality. This industry-relative approach has been relatively well studied in previous work.[1,4]

Although a more nascent research topic, many investors have intuitively understood that different sectors not only face different ESG issues, but also different levels of ESG-related risks in an absolute, aggregated sense. In fact, one reflection of these differences can be found in the MSCI ESG Ratings model. The MSCI ESG Rating of companies in more environmentally and labor intensive industries such as metals and mining have included an average of 7.5 ESG issues;[6] in contrast, for a less environmentally and labor intensive industry such as real estate investment trusts, a company's rating includes an average of 3.1 ESG issues.[7] (Please see Appendix 1 for an excerpt of ESG hotspots by industry.) Another view of these risk level

[2] Collins, S. and K.B. Sullivan. 2020. "Advancing Environmental, Social, and Governance and Investing: A Holistic Approach for Investment Management Firms. Deloitte.

[3] Friede, G., T, Busch. and A. Bassen. 2015. "ESG and Financial Performance. Aggregated Evidence from more than 2,000 Empirical Studies." Journal of Sustainable Finance and Investment 5 (4): 210–233.

[4] Giese, G., Z. Nagy and L.-E. Lee. 2020. "Deconstructing ESG Ratings Performance: Risk and Return for E, S and G by Time Horizon, Sector and Weighting." MSCI.

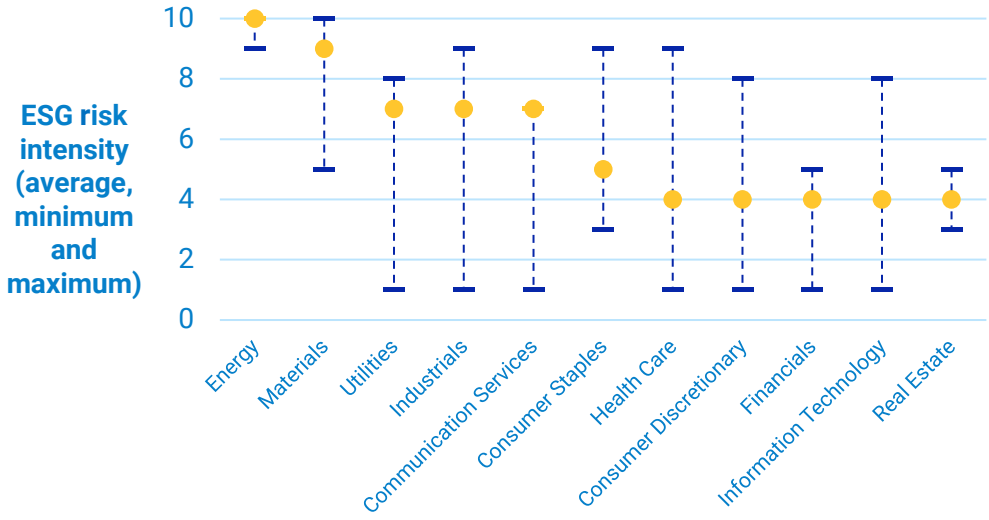
[5] Khan, Mozaffar N., George Serafeim, and Aaron Yoon. 2015. "Corporate Sustainability: First Evidence on Materiality." Harvard Business School Working Paper, No. 15-073.

[6] Key Issues include Carbon Emissions, Water Stress, Biodiversity & Land Use, Toxic Emissions & Waste, Labor Management, Health & Safety, Corruption & Instability and Corporate Governance.

[7] Key Issues include Opportunities in Green Building, Human Capital Development and Corporate Governance

differences between sectors is captured by MSCI's risk intensities that reflect the aggregated risk levels for each of the 158 GICS sub-industries. Exhibit 1 illustrates the average ESG industry risk intensity by GICS sector.

Exhibit 1: Variation in ESG Industry Risk Intensity by GICS Sector



Source: MSCI ESG Research. Sector ESG risk intensity ranking as of April 2020.[8] The average, minimum and maximum ESG risk intensity values were obtained from the sub-industries within each sector.

To what extent do the ESG characteristics of an industry influence the risk and performance of companies? In other words, viewed through a lens of "absolute" risk and performance, how do high-scoring companies in more intensive industries compare with low-scoring companies in less intensive industries?

In the following analysis, we investigated how these two approaches to scoring companies' ESG attributes — the "industry-relative" versus "absolute" approach — differed in their correlations with financial performance.

[8] MSCI's industry risk intensity methodology takes a bottom-up, data-driven approach to determine the relative magnitude of the ESG risks faced by different industries. Metrics such as carbon emissions, hazardous waste outputs, accident rates, product recalls, labor intensity, and perceived corruption prevalence are captured at the individual company business segment level and translated to a 1-10 decile score designed to allow comparisons between the 158 Global Industry Classification Standard (GICS®) sub-industries. For additional details, see MSCI ESG Industry Risk Intensity methodology document on ESG Manager

- We hypothesized that an industry-relative approach should show stronger correlations with financial variables that capture the "upside," since implicit in a relative approach is the concept of companies' competitiveness, which should reflect in their profitability over time.
- In contrast, we hypothesized that an absolute approach should show stronger correlations with financial variables that capture the "downside," as companies in some industries or types of businesses are more likely than others to experience negative incidents and/or are more exposed to market-wide shocks.

We use the two scores immediately underlying MSCI's ESG Letter Rating.[9] Specifically, the weighted average key issue score ("WAKIS") assesses the strength of a company's management efforts, relative to its risk exposure across a small set of differently weighted, environmental, social and governance key issues. By contrast, the industry-adjusted score ("IAS") normalizes a company's WAKIS relative to its industry peer-set and ultimately determines its ESG letter rating. Put more simply, the WAKIS denotes a company's **absolute ESG score**, while the IAS denotes a company's **industry-relative ESG score**.

Exhibit 2: High-level Summaries of the Absolute and Relative ESG Scores Used in the MSCI ESG Rating. Further Details are Provided in Appendix 3.

Absolute ESG Score (Weighted Average Key Issue, "WAKIS")	**Industry-relative ESG Score** (Industry Adjusted, "IAS")
Calculated based on the weighted average of scores received on all industry-relevant Key Issues contributing to the ESG Rating of a company. A high WAKIS indicates a company with strong management practices relative to its risk exposure across the set of industry-relevant ESG risks.	Calculated by normalizing the Weighted Average Key Issue Score to the industry peer set and adjusted to reflect any Ratings Review Committee overrides. This score determines the overall company rating (AAA-CCC). The IAS reflects the strength of a company's management practices relative to its risk exposure across the set of industry-relevant ESG risks, compared with industry peers facing similar risks.

[9] For more information see https://www.msci.com/esg-ratings

Analytical Approach

We build on previous research that tested for correlations between fundamental financial variables and ESG scores over a ten-year period (January 2007-May 2017, Giese et al 2019).[10] This analysis found that companies with higher industry-relative ESG scores demonstrated higher profitability and lower systematic and stock-specific risk as summarized below. By replicating this analytical approach for both absolute and industry-relative ESG scores we aimed to test for differences in the strength of each score in capturing either "upside" or "downside" signals.

Giese et al. (2019) identified three economic transmission channels to assess the extent to which ESG characteristics are correlated with financial performance:

1. **Cash-flow channel**: Companies with high MSCI ESG Ratings have been shown to be more profitable, to display more stable earnings and to offer higher dividend yields, while controlling for other financial factors.

   The economic rationale suggests that stronger ESG characteristics may have been linked to better business practices, which may result in attracting more talented employees and better innovation management, developing long-term business plans and incentive plans for management, and achieving better customer satisfaction (Fatemi et al. 2015).[11]

2. **Idiosyncratic risk channel**: Companies with high MSCI ESG Ratings have historically shown lower frequencies of drawdowns in their share prices, while controlling for other financial factors.

   Companies with high ESG Ratings were considered to have had better abilities to manage and mitigate company-specific risks such as accidents and litigation than lower-ranked peers in the same sector.

3. **Valuation channel**: Companies with high MSCI ESG Ratings have historically shown lower levels of systematic risk, lower cost of capital and therefore higher levels of valuations, while controlling for other financial factors.

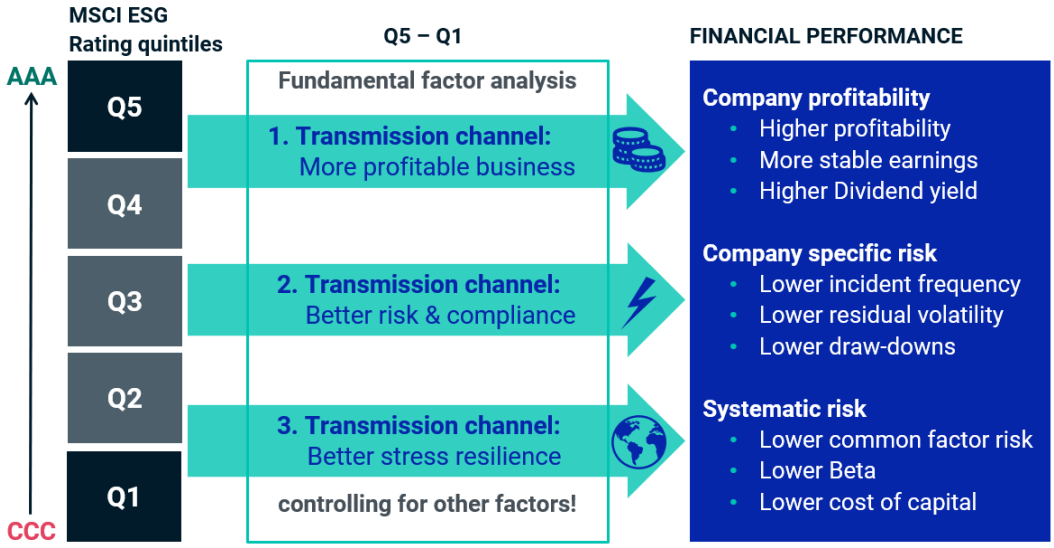
   The economic rationale is that companies with strong ESG characteristics may have been more resilient when faced with changing market

[10] Giese, G., L.-E. Lee, D. Melas, Z. Nagy and L. Nishikawa. 2019. "Foundations of ESG Investing: How ESG Affects Equity Valuation, Risk and Performance." Journal of Portfolio Management 45 (5): 69-83.

[11] Fatemi, A., Fooladi, I. & Tehranian, H. 2015. "Valuation effects of corporate social responsibility." Journal of Banking & Finance 59: 182-192.

environments, such as fluctuations in financial markets and changes in regulation.

Exhibit 3: Economic Transmission Channels to be Tested



Source: Giese, G., L.-E. Lee, D. Melas, Z. Nagy and L. Nishikawa. (2019). "Foundations of ESG Investing: How ESG Affects Equity Valuation, Risk and Performance." Journal of Portfolio Management 45 (5): 69-83.

We analyzed these three transmission channels using scores from MSCI ESG Ratings[12] for the MSCI World Index[13] universe over a 10- (January 2010 - December 2019), 5- (January 2014 - December 2019) and 1-year period (January 2019 - December 2019). The universe contained over 1,600 stocks and was therefore sufficiently diversified for the statistical analysis performed in this paper. All risk and factor calculations were performed using the Barra Long-Term Global Equity Model (GEMLT).

In our analysis, we measured the distribution of financial variables across five ESG score quintiles (Q1 to Q5), where Q1 contains companies with the lowest ESG ratings

[12] For more information see https://www.msci.com/esg-ratings

[13] MSCI ESG Research data and information provided by MSCI ESG Research LLC. MSCI ESG Indexes utilize information from, but are not provided by, MSCI ESG Research LLC. MSCI Equity Indexes are products of MSCI Inc. and are administered by MSCI UK Limited

("bottom scored") and Q5, the highest ("top scored"). We defined two separate sets of top and bottom-scored companies, based on the absolute (WAKIS) and industry-relative scores (IAS), respectively. For each financial variable, we measured the difference between top and bottom-scored companies (Q5 minus Q1). Financial variables, such as beta or book-to-price ratio, are based on GEMLT and are in the format of z-scores, while we used t-statistics to determine the statistical confidence of any differences.

Per the economic arguments outlined in Exhibit 2, for both ESG score types, we expected to see positive correlations with profitability (first channel) and negative correlations with idiosyncratic and systematic risks (second and third channels).

RESULTS OF ECONOMIC TRANSMISSION CHANNEL ANALYSIS

In the three economic transmission channels, the results for both the absolute and industry-relative ESG scores were in line with Giese et al (2019). Using either score, companies with higher MSCI ESG scores showed positive exposure to financial variables denoting the cashflow channel, and negative exposure to financial variables denoting the idiosyncratic and systematic risk channels, over 1-year, 5-year and 10-year periods. Using absolute and industry-relative ESG scores did, however, produce some differences results across the three economic transmission channels, as shown in Exhibit 4.

1. **Cash-flow Channel:** We found bigger differences and more consistency between top and bottom-scored companies when using the ***industry-relative*** score compared with the absolute score across all three time periods. The difference was especially pronounced for the Gross Profitability factor. This supports our hypothesis that the industry-relative ESG score would be better than the absolute ESG score in capturing the potential "upside" by reflecting competitiveness.

   The absolute score did show larger differences between top and bottom-scored companies in the Trailing-Dividend Yield factor but was somewhat negatively correlated with Gross Profitability factor, suggesting it may be less useful for differentiating company competitiveness.

2. **Idiosyncratic Risk Channel:** Here we found bigger differences between top and bottom-scored companies on their exposure to company-specific and idiosyncratic risk variables when using the ***absolute*** score across all three time periods. This supports our hypothesis that the absolute ESG score would be

better than the industry-relative score at capturing "downside" risks, as companies facing higher level of aggregated ESG risks are more likely to face negative incidents that introduce greater volatility in their performance.

The size of the difference for the industry relative score was stable across 1-, 5- and 10-year period. However, interestingly, the difference between the top and bottom-scored companies' residual volatility appeared to have increased over more recent periods.

3. **Valuation Channel:** The results were mixed for this channel. There were notable differences between top and bottom-scored companies using both scores, but neither score showed a clear advantage over the other. We had hypothesized that the absolute ESG score would be better than the industry-relative ESG score at capturing "downside" risks, as companies facing higher level of aggregated ESG risks should be more likely to face market-wide shocks that introduce greater systematic volatility, but the findings did not consistently bear this out. While in the 10-year period, the difference between top and bottom-scored companies in their exposure to systematic risk was greater using the industry-relative score compared with the absolute score, the inverse was true in the 1-year period.

Exhibit 4: Difference in Active Exposure to Financial Variables Between Top and Bottom-scored Companies Across Three Economic Transmission Channels for Industry-relative (IAS) and Absolute (WAKIS) ESG Scores

	Expected sign, +/- (top vs. bottom-scored quintile	10-year period (Jan 2010 - Dec 2019)		5-year period (Jan 2015 - Dec 2019)		1-year period (Jan 2019 - Dec 2019)	
		Industry-relative	Absolute	Industry-relative	Absolute	Industry-relative	Absolute
Gross Profitability	+	0.09	-0.04	0.10	-0.06	0.11	-0.06
Trailing Dividend Yield	+	0.14	0.20	0.14	0.23	0.09	0.20
Cash-flow channel average	+	**0.12**	**0.08**	**0.12**	**0.08**	**0.10**	**0.07**

	Expected sign, +/- (top vs. bottom-scored quintile	10-year period (Jan 2010 - Dec 2019)		5-year period (Jan 2015 - Dec 2019)		1-year period (Jan 2019 - Dec 2019)	
		Industry-relative	Absolute	Industry-relative	Absolute	Industry-relative	Absolute
Residual CAPM Volatility	-	-0.27	-0.31	-0.32	-0.45	-0.31	-0.47
Kurtosis	-	-0.06	-0.10	-0.03	-0.10	-0.04	-0.12
Idiosyncratic risk channel average	-	**-0.17**	**-0.21**	**-0.18**	**-0.27**	**-0.18**	**-0.30**
Systematic Volatility	-	-0.23	-0.21	-0.30	-0.35	-0.39	-0.46
Variability in Earnings	-	-0.15	-0.11	-0.24	-0.28	-0.15	-0.27
Historical beta	-	-0.11	-0.01	-0.16	-0.12	-0.39	-0.42
Book-to-price	-	-0.17	-0.14	-0.24	-0.20	-0.20	-0.21
Predicted Earnings to Price	-	-0.12	-0.10	-0.15	-0.12	-0.18	-0.20
Valuation channel average	-	**-0.15**	**-0.12**	**-0.22**	**-0.21**	**-0.26**	**-0.31**
Overall average		**0.15**	**0.13**	**0.19**	**0.20**	**0.21**	**0.26**

Source: MSCI. Data as of December 31, 2019 for MSCI World Index constituents

IDIOSYNCRATIC RISK: FREQUENCY OF STOCK-PRICE DRAWDOWNS AND CREDIT SPREAD SPIKES

While previous research and the current analysis has demonstrated that the MSCI ESG rating has translated into risk and performance through all three transmission channels, the idiosyncratic risk channel has tended to show the most consistent and

statistically significant effects across multiple studies.[14,15,16] To better understand how the absolute ESG score could potentially improve upon the relative ESG score in capturing company-specific risks, we analyzed the frequency of sharp declines in share price, or drawdowns, during our study period. Following Giese et al 2019, we first defined specific price loss thresholds (10%, 20%, etc.) and counted the number of companies with stock-price drawdowns that exceeded those thresholds during discrete three-year periods (the three years following each monthly rebalance of the ESG scores into quintiles). We then compared the frequency of these drawdowns for top and bottom-scored companies.

Looking at both the industry-relative and absolute ESG scores, top-scored companies had fewer drawdowns at all loss thresholds compared with bottom-scored companies (Exhibit 5; see Appendix 4 for detail on both top and bottom-scored quintiles). Top-scored companies on both the absolute and industry-relative ESG scores were equally (un)likely to experience stock-price losses exceeding 10-50%. However, companies with the lowest absolute scores had more frequent drawdowns than companies with the lowest industry-relative scores.

- Bottom-scored companies on the absolute ESG score were 2.0 times more likely to experience a 30%+ stock-price loss than the top-scored companies; in comparison, bottom-scored companies on the relative ESG scores were 1.75 times more likely to experience a 30% stock-price loss than the top-scored companies.
- At a 50% loss threshold, the ratio stood at 2.6 times for top- versus bottom-scored companies on the absolute ESG scores, versus 2.1 times for top- versus bottom-scored companies on the relative score.

The results seem intuitive. They suggest that the **absolute ESG score may have reflected a "doubling down" effect**, as the bottom scores likely captured the lowest scoring companies in the most intensive industries (those facing more ESG issues at higher risk exposure levels). These companies consequently were more likely to

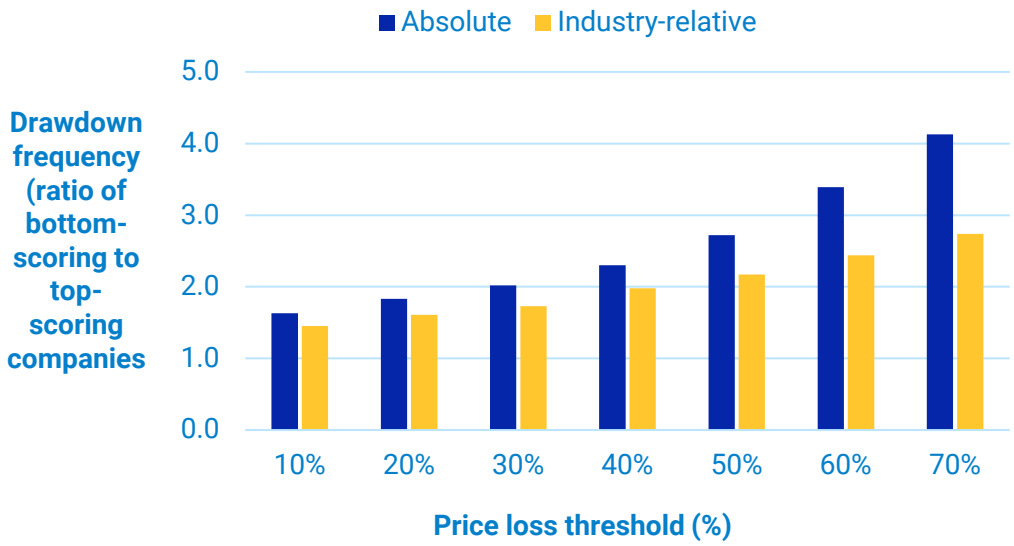
[14] Verheyden, T., Eccles, R.G. & Feiner, A. 2016. "ESG for All? The Impact of ESG Screening on Return, Risk, and Diversification". Journal of Applied Corporate Finance 28 (2): 47-55.

[15] Dunn, J., Fitzgibbons, S. & Pomorski, L. 2017. "Assessing Risk through Environmental, Social and Governance Exposures". AQR.

[16] Pollard, J.L., Sherwood, M.W. & Klobus, R.G. 2018. "Establishing ESG as Risk Premia". Journal of Investment Management 16 (1): 1-12.

experience downside negative events, compared to bottom-scoring companies as measured only relative to their industry peers.

Exhibit 5: The Absolute ESG Score (WAKIS) Was Better at Differentiating Drawdown Frequencies Between Top and Bottom-scored Companies (Q1 vs. Q5)



Source: MSCI. Data from January 2010 to December 2019 for MSCI World Index constituents

We also tested whether the stronger correlation between stock-price drawdowns and the absolute ESG score was mirrored in a corollary for credit risk. The relationship between ESG ratings and performance of fixed income issuers has been much less studied compared to the equity universe.[17,18] This is due in part to much more limited data history for fixed income as well as later adoption of ESG integration into the fixed income investment process among practitioners.[19]

We worked with a more limited dataset in terms of the available data history (June 2015 to May 2020) and coverage universe (investment grade corporate issuers within the Bloomberg Barclays Global Aggregate Index). Following Mendiratta and Varsani (2020),[18] we used average option-adjusted spreads (OAS) as a measure of

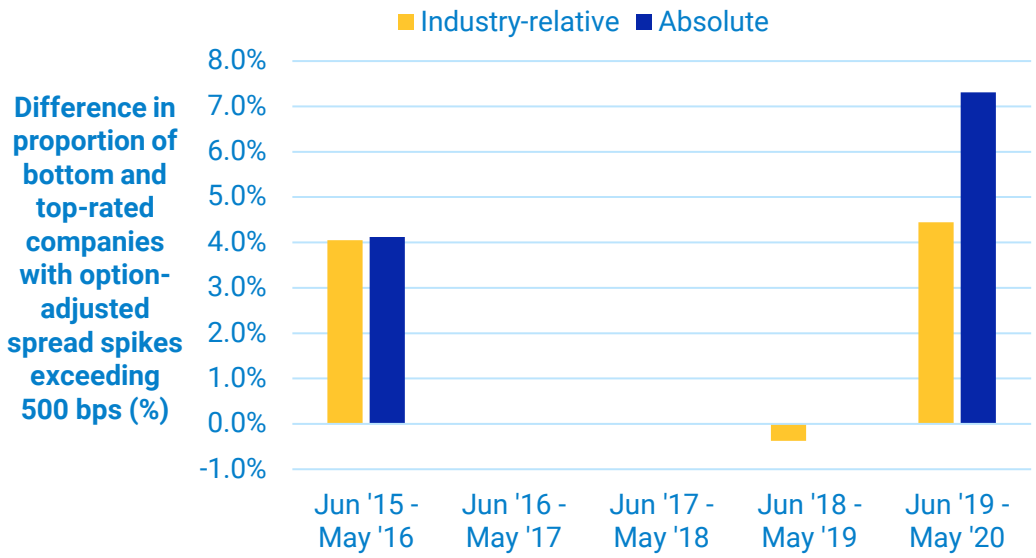
[17] Ben Slimane, M., Brard, E., Le Guenedal, T., Roncalli, T. & Sekine, T. 2020. "ESG Investing and Fixed Income: It's Time to Cross the Rubicon". Amundi Asset Management.

[18] Mendiratta, R. & Varsani, H. 2020. "Corporate Bonds Through a Factor and ESG Lens". MSCI.

[19] Orsagh, M. 2019. "Equities versus Fixed Income: How ESG Factors Affect Both Asset Classes". CFA Institute.

performance. Over a five-year timespan (June 2015 - May 2020), for each one-year period we compared the number of large increases (spikes) in OAS for individual issuers. We compared the proportion of top and bottom-scored issuers that exhibited large (greater than 500 bps) spikes in OAS — a metric that reflects elevated concern levels from investors and offers a fixed income analogy for stock-price drawdowns.

Exhibit 6: Bottom-scored Companies Were More Likely to Exhibit Large Spikes in OAS During Periods of Economic Downturn for the Industry-relative (IAS) and Absolute (WAKIS) ESG Scores



Source: MSCI. Data from June 2015 to May 2020 for corporate constituents of the Bloomberg Barclays Global Aggregate Index (1500+ unique issuers as of May 2020, after mapping child issuers to their respective parent entities).

In line with the stock-price drawdown results (Exhibit 5), bottom-scored companies on both the absolute and industry-relative ESG scores experienced OAS spikes more frequently than top-scored companies during prolonged economic downturns. However, in contrast to the stock-price drawdown results, we did not find a consistent difference between the absolute and industry-relative ESG scores. Our expectation that the "doubling down" of high-risk companies (bottom-scored companies in industries with high ESG risk intensity) would be reflected in more frequent OAS spikes was true for one downturn period (June 2019 - May 2020), but not both. These findings point to future avenues for study, including how ESG ratings might relate to credit risk and performance.

Conclusion

As practitioners explore how and when to use absolute versus industry-relative ESG signals, we undertook an analysis of how the two approaches might capture different aspects of company risk and performance, using the scores that underlie MSCI ESG Ratings.

Building on research published in our Foundations of ESG Investing series,[20] we looked at the relationships between financial fundamentals and both scores across three economic transmission channels: the cash flow channel, the idiosyncratic risk channel and the systematic risk channel. In both cases, the highest scored companies were more profitable and carried lower levels of idiosyncratic and stock-specific risk than the lowest scored companies. This was true across, 1-, 5- and 10-year periods, and the results were in line with previous studies.

The industry-relative score was, however, slightly better at capturing potential "upside." By controlling for industry-specific risk intensity with a "best in class" approach, the industry-relative score may be better at signaling competitiveness or differentiating companies' ability to generate profits.

The absolute score was slightly better at capturing "downside" risks. Companies with lower absolute scores tend to face higher total ESG risks: they generally operate in risk-intensive industries in addition to having weak ESG management practices. This may explain why they were more prone to negative incidents. There were notable differences in stock-price drawdown frequency between top and bottom scored companies using both types of scores, but the difference was larger using the absolute scores.

The upshot for investors is that both absolute and industry-relative ESG scores provided useful differentiation between top and bottom-scored companies but that choosing one over the other could help support tailored approaches. Investors more interested in signals from idiosyncratic risks, and particularly tail risks, may be better served by the absolute ESG score (WAKIS). By contrast, investors looking to identify ESG outperformers, irrespective of how risky their industries might be, may be better served by an industry-relative score (IAS).

[20] Giese, G., L.-E. Lee, D. Melas, Z. Nagy and L. Nishikawa. 2019. "Foundations of ESG Investing: How ESG Affects Equity Valuation, Risk and Performance." Journal of Portfolio Management 45 (5): 69-83.

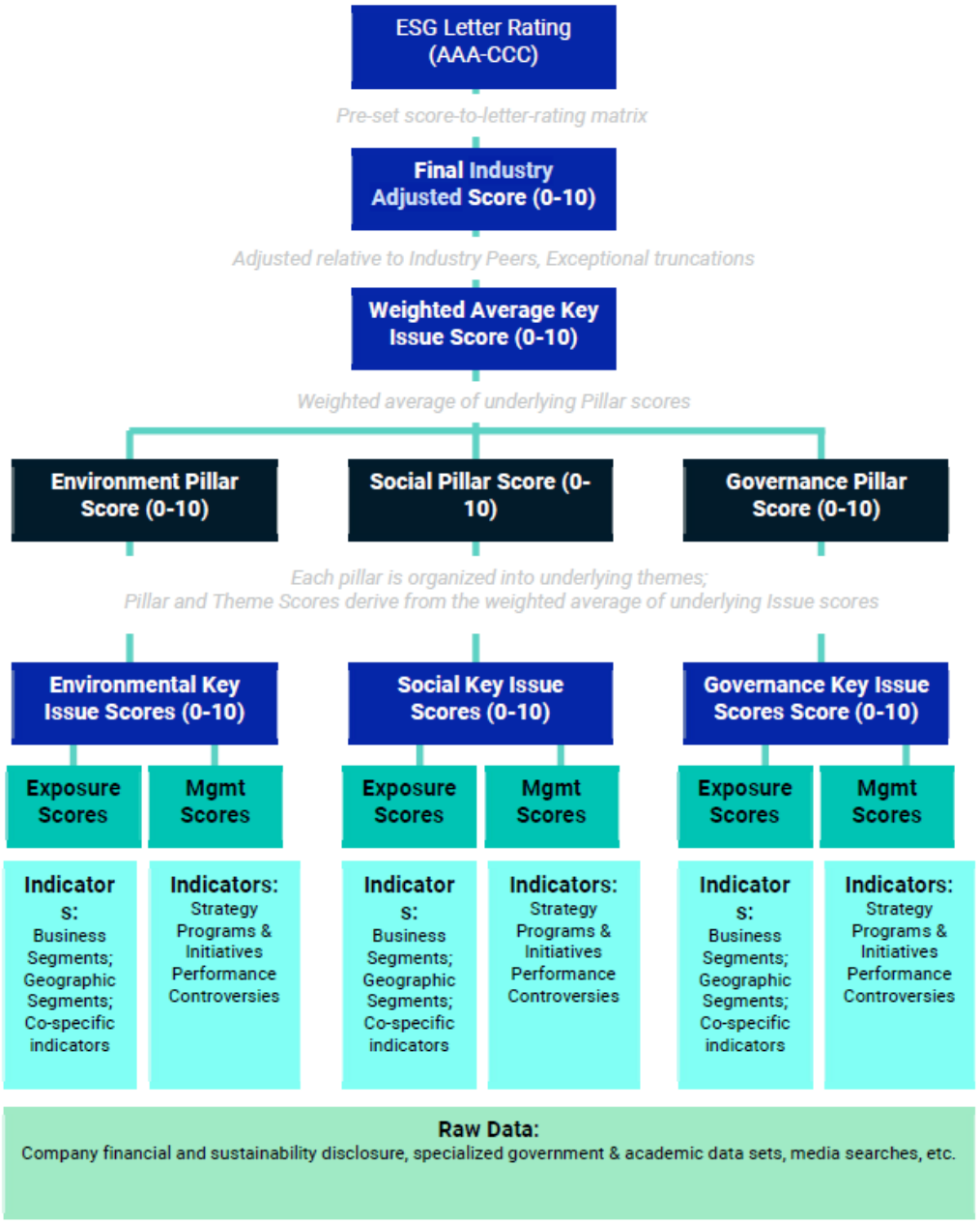
Some of our findings also raised questions for further research. For example, why were differences between the two score types not apparently reflected in company valuation metrics? More substantively, although we did we see a difference in the correlation between absolute and industry-relative scores with OAS spikes, it was not as consistent as we had expected. Given that other findings suggested useful distinctions between the two scores for spotting downside risk, why did we observe mixed results in our fixed-income analysis? Further work focused on the relationship between fixed-income performance and ESG scores may help shed light on these and related questions.

Appendix 1: ESG Hotspots by Industry

			Environmental												Social														Governance		
GICS Sector	**GICS Sub-Industry Code**	**GICS Sub-Industry Name**	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	■				■			■						■															■	■	
	10102050	Coal & Consumable Fuels	■			■	■			■						■	■														■	■	
Materials	15103020	Paper Packaging	■			■		■			■					■					■										■		
	15104010	Aluminium	■			■				■						■	■														■	■	
	15104020	Diversified Metals & Mining	■			■	■			■						■	■														■	■	
	15104025	Copper	■			■	■			■						■	■														■	■	
	15104030	Gold				■	■			■						■	■														■	■	
	15104040	Precious Metals & Minerals				■	■			■						■	■														■	■	
	15104045	Silver				■	■			■						■	■														■	■	
Industrials	20201010	Commercial Printing						■								■															■		
	20201050	Environmental & Facilities Services	■													■	■														■		
	20201060	Office Services & Supplies	■													■															■		
	20201070	Diversified Support Services	■													■															■	■	
	20202020	Research & Consulting Services	■															■				■									■		
Health Care	35102015	Health Care Services	■													■				■		■									■	■	
	35102020	Health Care Facilities	■													■				■		■									■	■	
	35102030	Managed Health Care	■																	■		■		■							■	■	
	35201010	Biotechnology								■								■		■									■		■	■	
	35202010	Pharmaceuticals								■								■		■									■		■	■	
Financials	40101010	Diversified Banks							■									■				■	■					■			■		■
	40101015	Regional Banks							■									■				■	■					■			■		■
	40102010	Thrifts & Mortgage Finance							■									■				■	■					■			■		■
	40301020	Life & Health Insurance			■													■					■	■	■			■			■		
	40301030	Multi-line Insurance			■													■					■	■	■			■			■		
Real Estate	60101060	Residential REITs												■				■													■		
	60101070	Retail REITs												■				■													■		
	60101080	Specialized REITs												■				■													■		
	60102020	Real Estate Operating Companies												■				■													■		
	60102040	Real Estate Services												■				■													■		

Select sub-sample of GICS Sub-industries and the standard ESG key issues assigned to each sub-industry as per the MSCI ESG Ratings methodology (as of January 2020).

Appendix 2: Hierarchy of Scores at Various Levels

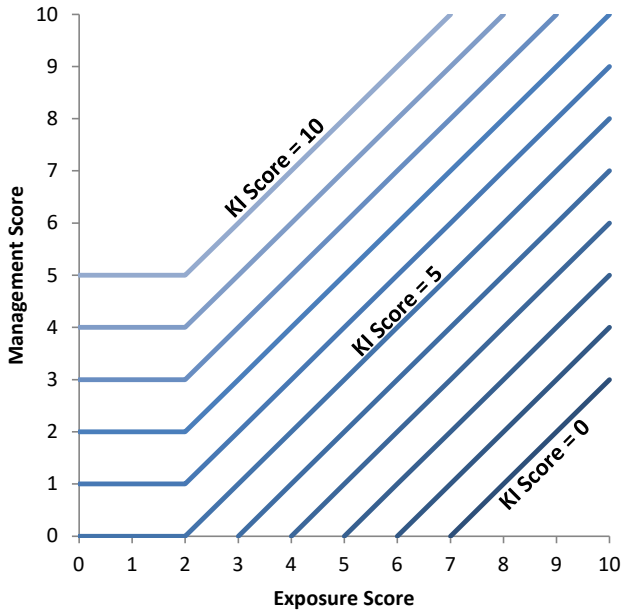


Appendix 3: Design of MSCI ESG Scores

WEIGHTED AVERAGE KEY ISSUE SCORE (WAKIS)

The WAKIS is a weighted average of the underlying Key Issue scores, which evaluate the company's exposure to risk or opportunity and its capacity to manage that exposure. The diagram below shows how each Key Issue score is determined by combining risk exposure and management. The Key Issue scoring is designed such that at very high levels of risk exposure, a company's maximum achievable Key Issue Score is lower than 10, indicating that regardless of a company's actions or programs to mitigate risk, a certain level of risk persists. In other words, some level of unmanageable risk is built into the model for companies facing very high levels of risk on a key issue.

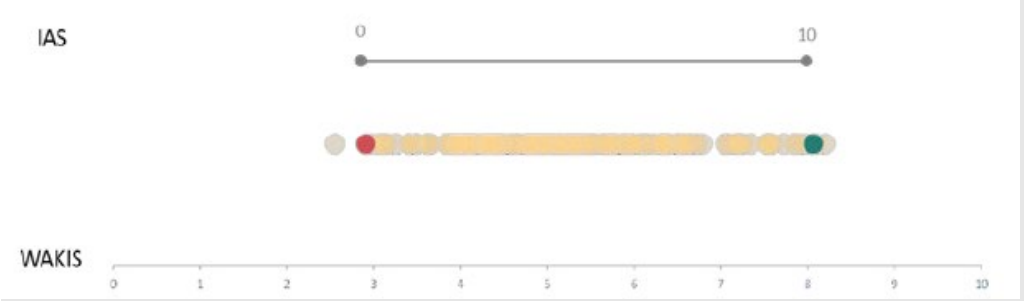
Exhibit 7: Combining Risk Exposure and Management to obtain the Key Issue (KI) score



Source: MSCI ESG Research

INDUSTRY ADJUSTED SCORE (IAS)

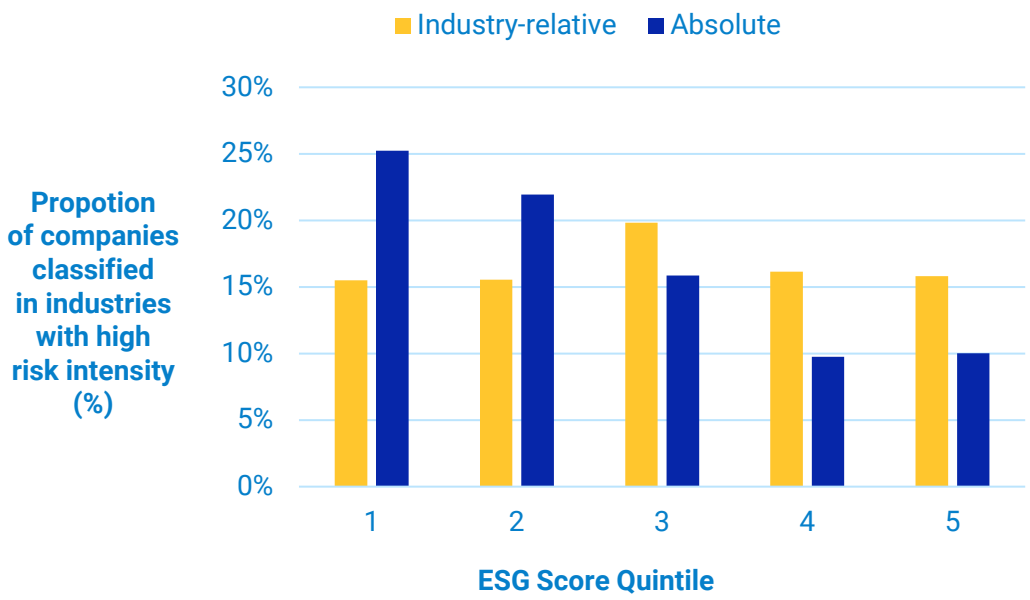
To determine a company's IAS, its WAKIS is compared with the benchmark score levels obtained by a 5% winsorization of the range of WAKIS within that industry peer set. The relation between the WAKIS and the IAS is shown in the below graphical illustration. For instance, if the score distribution in an industry is such that the 2.5th and the 97.5th percentile levels are 2.9 and 8.1 respectively (on a scale of 10), these are given a score of 0 and 10 respectively in the industry adjusted scale (IAS) and the remaining companies' scores are linearly interpolated based on these values.



Source: MSCI ESG Research

The exhibit below demonstrates the effect of controlling for industry-specific risk intensity. That is, the proportion of companies classified into high-risk industries (e.g., metals and mining) is relatively consistent across score quintiles for industry-relative score. However, for the absolute score, companies in lower score quintiles were overrepresented in high-risk industries.

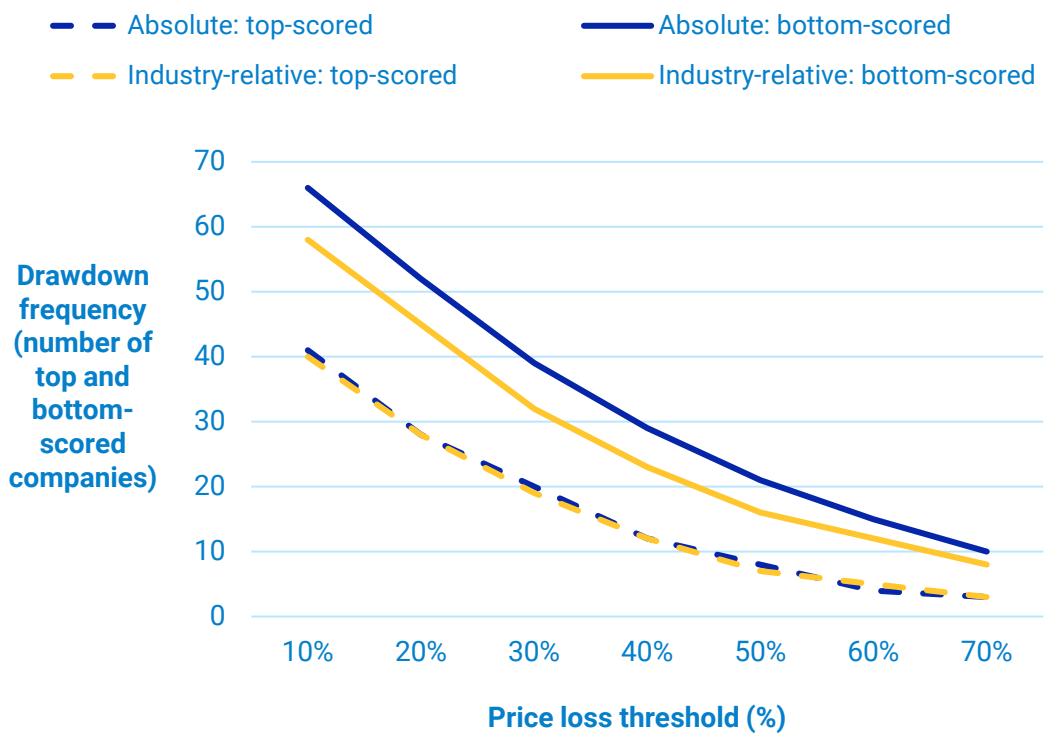
Exhibit 8: Companies Classified in Industries with High ESG Risk Intensities Were More Likely to Have a Low Absolute ESG Score



Source: MSCI ESG Research. ESG scores as of December 2019 for MSCI ACWI Index constituents. Industry ESG Risk Intensity ranking as of April 2020.

Appendix 4: Drawdown Frequencies

Exhibit 9: The Absolute ESG Score (WAKIS) Was Better at Differentiating Drawdown Frequencies Between Top and Bottom-scored Companies



Source: MSCI. Data from January 2010 to December 2019 for MSCI World Index constituents.

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