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RESEARCH INSIGHT

MSCI ESG Ratings and Cost of Capital

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Executive summary

Cost of capital is a key piece of information for a company in its decision-making process as well as for the providers of capital. This measure determines the minimum rate of return a company needs to earn to satisfy its creditors and shareholders. A large body of research has found links between a company's exposure to, and management of, environmental, social and governance (ESG) risks and its financial performance, for which the cost of capital plays a key role.

The objective of our study was to determine whether companies with higher resilience to financially material sustainability-related risks (as measured by MSCI ESG Ratings) did benefit from a lower cost of capital.

Key takeaways:

- A company's exposure to, and management of, financially material sustainability-related risks inform its overall risk profile, which has a bearing on how easily it can raise capital in the equity and debt markets.
- Understanding what determines a company's cost of capital, including company-specific factors, such as capital structure, and market-wide factors, such as benchmark interest rates, is critical in examining time-series and cross-sectional differences among companies.
- We found a significant historical correlation between a company's MSCI ESG Rating and its financing costs. This relationship held in both equity and debt markets, which we confirmed using the dynamic, market-determined proxies of stock beta and credit spreads, respectively.
- Companies assessed to be the most resilient to financially material sustainability-related risks consistently financed themselves more cheaply than those considered more vulnerable. This relationship, on average, held in both debt and equity markets, even when controlling for other characteristics that substantially influence the cost of capital, such as home market, sector affiliation, funding currency and credit quality.
- Beyond examining the historical correlations, we wanted to see if a change in the MSCI ESG Rating could have been used as a forward-looking indicator for the path of a company's cost of capital. Although we did not observe significant changes in financing costs after small rating movements, we did observe a stronger directional relationship with more-pronounced rating movements (+/- two or more notches).
- Finally, we found that focusing on the sustainability-related issues that may be the most financially material for certain companies' risk profiles (e.g., carbon emissions for heavy polluters or product safety for retail-focused businesses) may offer an even better understanding of what may drive the financing costs in different industries.

Introduction

Cost of capital is a key piece of information in the decision-making process for companies raising funds in debt and equity markets, as well as for the providers of these forms of capital. The lower it is, all else equal, the better for both.

A lower cost of capital means that a company can finance itself more cheaply, thus directly lowering the rate of return it needs to generate to satisfy its creditors and shareholders. From an investor's point of view, a company's cost of capital drives the opportunity cost of investing capital in it, its (expected) risk and return and ultimately the valuation of its equity and debt securities.

As Damodaran (2016) argued, few numbers in finance are used as much as the cost of capital, and a substantial body of research has been dedicated to identifying its main drivers (e.g., Brotherson et al. 2013). Part of this research examined and identified a company's exposure to, and management of ESG risks and opportunities as one of the main contributors to their fundamental and market performance (Atz et al. 2022). Such links would also have direct consequences for their cost of capital. Lodh (2020) noticed that companies with higher MSCI ESG Ratings had a lower cost of capital than their lower-rated peers.

Therefore, the objective of this study is to build on Lodh's observation and determine whether companies that exhibited better resilience to financially material sustainability-related risks (measured by MSCI ESG Ratings) did benefit, over the long run, from a lower cost of capital.

Setting up the theoretical framework

Links between sustainability and financial performance

A large body of MSCI's prior research, particularly Giese et al. (2017), focused on setting up the theoretical framework to explain how a company's exposure to, and management of, sustainability-related risks and opportunities may influence its financial performance. The authors identified **three transmission channels** that link a company's sustainability profile with its financial performance:

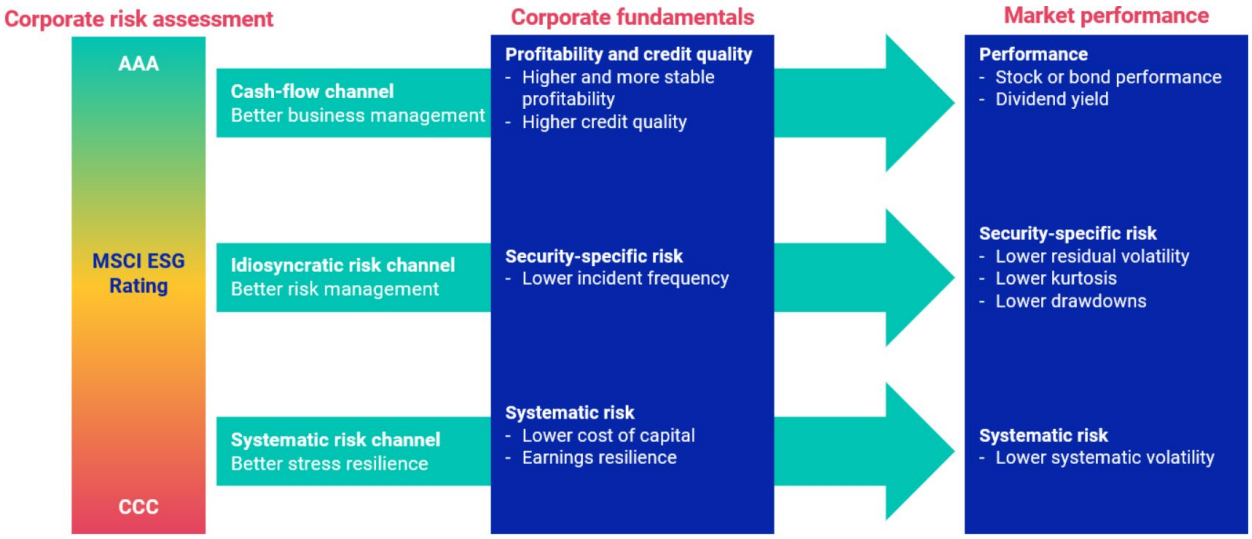
- The **cash-flow channel,** which suggests that companies with higher MSCI ESG Ratings tend to be more competitive, resulting in higher profitability and dividend distributions to their owners.
- The **idiosyncratic-risk channel**, which highlights better management of stock-specific business and operational risks by firms with higher MSCI ESG ratings, resulting in more-stable stock prices and lower idiosyncratic tail risks.
- The **systematic-risk (valuation) channel,** which underscores that companies with higher MSCI ESG ratings typically exhibit lower exposure to systematic risks, resulting in a lower cost of capital. A lower cost of capital leads to a higher valuation within a discounted-cash-flow (DCF) model.

Mendiratta, Varsani and Giese (2021) built on this framework and set it within the Merton credit-risk model to explain how the same transmission channels may help explain the relationship between a company's MSCI ESG Rating and its default risk.

In both studies, higher-rated companies outperformed their peers on the metrics used to validate the transmission-channel framework. We used these findings to form our view for why and how the

information contained in a company's MSCI ESG Rating may feed into its cost of capital — an important step in the transmission-channel framework.

Exhibit 1: Transmission channels for how sustainability profile may affect financial performance



Source: MSCI ESG Research

Understanding the cost of capital and its components

Companies primarily finance themselves through **equity** (in the stock market) and **debt** (in the bond market, but also bank loans and other forms of private debt), and to a lesser extent by hybrid instruments, such as **preferential capital**. We use cost-of-capital data for each issuer based on the formulas defined in Appendix 1.[1]

Because preferred stock is not a common means of financing, we focused our analysis on the costs of equity and debt and the resulting weighted-average cost of capital (hereafter, referred to simply as the cost of capital or financing costs).[2]

In addition to examining the costs of equity and debt and to control for variations in these costs caused by macro factors (e.g., differences in the relevant risk-free rate or equity-market risk premium for issuers based in different regions), we examined the issuer-specific, market-determined components (or proxies) of each. In the equity market, we use stock **beta (*β*)**, which measures systematic risk exposure and translates the equity risk premium into the required rate of return for a company. In the bond market, we use the **credit spread** of an issuer's outstanding bonds, which on aggregate reflect the issuer-specific credit risk add-on to the benchmark rate (usually a duration-matched government bond or swap rate).

[1] Cost-of-capital data used in this report is based on the MSCI weighted-average cost of capital (WACC) calculation methodology.

[2] The average weight of equity in the capital structure of sampled issuers (n = 4,319) was 69%, and of debt was 31%, and for preferred stock only 0.2% over our study period, from August 2015 through March 2024.

Data description and methodology

Our dataset contained all corporate issuers in our equity or corporate-bond flagship market-weighted indexes – i.e., with equity included in the **MSCI ACWI Index** or bonds included in **MSCI Corporate Bond Indexes** – comprising 4,319 unique issuers with available monthly cost-of-capital data from August 2015 through May 2024.[3]

To test the relationship between a company's MSCI ESG Rating and its cost of capital, we divided issuers into five equal-weighted quintiles based on their industry-adjusted score (IAS) that directly underlies the MSCI ESG Rating: **top ESG rating** (highest-scoring companies); **high**, **mid** and **low** (average-scoring companies); and **bottom ESG rating** (lowest-scoring companies).[4]

Finally, to address differences in financing costs caused by macro factors rather than by differences in an issuer's risk profile, and to isolate in our results the influence of the information contained in the MSCI ESG Rating, we:

- conducted cost-of-capital **comparisons within peer groups** based on a company's home market, sector, credit quality and, for debt, also currency, by comparing the cost of capital and its components among MSCI ESG Rating quintiles calculated within these control groups.
- verified whether the **dynamic, market-determined components** of a company's cost of capital — its systematic equity risk (beta) and credit risk (option-adjusted spread, or OAS) — confirmed the results.

Beyond examining the correlation between an issuer's MSCI ESG Rating and its cost of capital, we used the Mann-Whitney U test to determine the statistical significance of the differences in the cost-of-capital distribution among the ESG rating quintiles (Appendixes 3 and 4).

Resilience to sustainability-related risks played a role in companies' financing costs

MSCI ESG Ratings are designed as an information tool for global investors. They assess a company's exposure to, and management of, financially material sustainability-related risks and opportunities relative to their global industry peers.

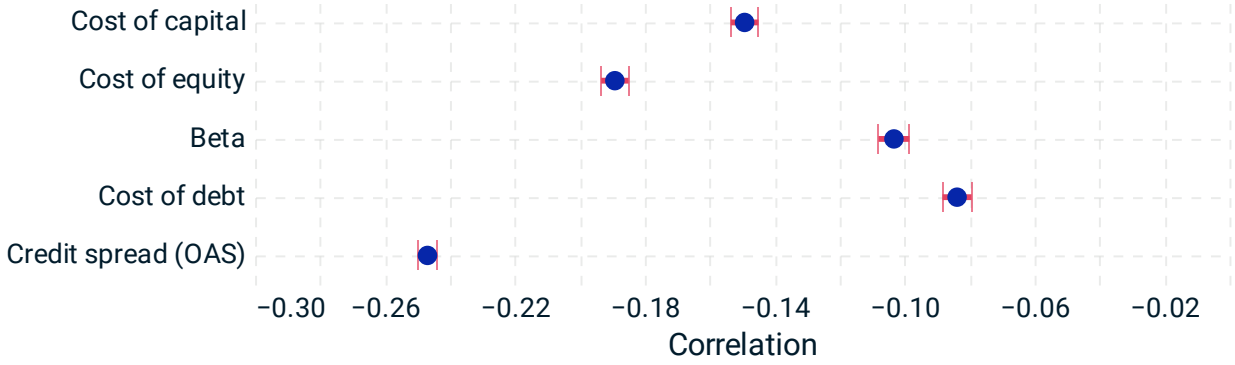
So, despite the cost-of-capital data containing some country- and sector-specific biases, for our hypothesis to hold, we would expect some degree of correlation between a company's MSCI ESG Rating and its cost of capital even before controlling for these influences, when applied to our large and diverse global sample over a long study period with periodic ratings turnover (i.e., 9% of companies' ratings changed annually).

As Exhibit 2 shows, a company's resilience to sustainability-related risks (measured by its MSCI ESG Rating), which informs its overall risk profile, was negatively correlated with all examined cost-of-capital measures (i.e., the higher the perceived resilience to sustainability-related risks, the lower the cost of each).

[3] Refer to MSCI Market Cap Indexes and MSCI Fixed Income Indexes. To minimize the effects of data-quality issues and extreme outliers on our results, we removed outliers using the interquartile range (IQR) method (Appendix 3).

[4] MSCI ESG Ratings Methodology (June 2022).

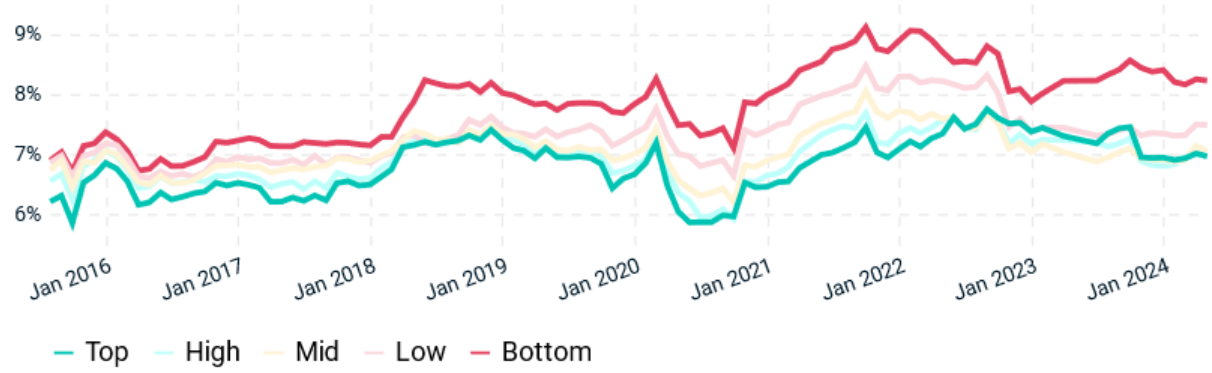
Exhibit 2: Historical correlation between companies' MSCI ESG Rating and their cost of capital



Data as of May 31, 2024. We calculated correlations using the IAS, which adjusts an issuer's performance on the E, S and G pillars relative to its global industry peers (scale 0-10) and underlies its MSCI ESG Rating (scale AAA to CCC). The correlation coefficients (blue) and standard error ranges (red) were significant at a 99% confidence level of rejecting H_0 that the slope is zero using the Wald test. Source: MSCI ESG Research

The lowest-rated companies had the highest financing costs (7.9%, on average, over the study period), while the top-rated companies, on average, financed themselves at the lowest rate (6.8%) over the study period (Exhibit 3).

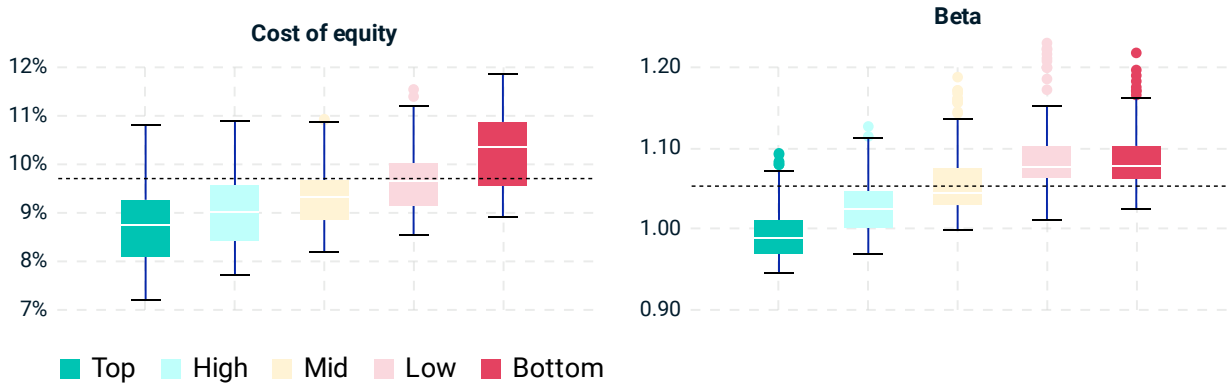
Exhibit 3: Cost of capital across MSCI ESG Rating quintiles



Data period from August 2015 through May 2024. We divided the entire study sample (n = 4,319 unique issuers) into quintiles each month based on IAS score, which underlies the MSCI ESG Rating, and compared each quintile's cost of capital monthly (106 observations). The difference between the top and bottom ESG quintiles over the study period was significant at a 99% confidence level using the Mann-Whitney U test. Source: MSCI ESG Research

The equity and debt components of the total financing costs confirmed the results. The top-rated companies had a significantly lower cost of equity even after addressing the home-market factors (local risk-free rate and equity risk premium). Issuers in the top quintile also had a significantly lower beta (against their local stock market) than those in the bottom quintile (Exhibit 4).

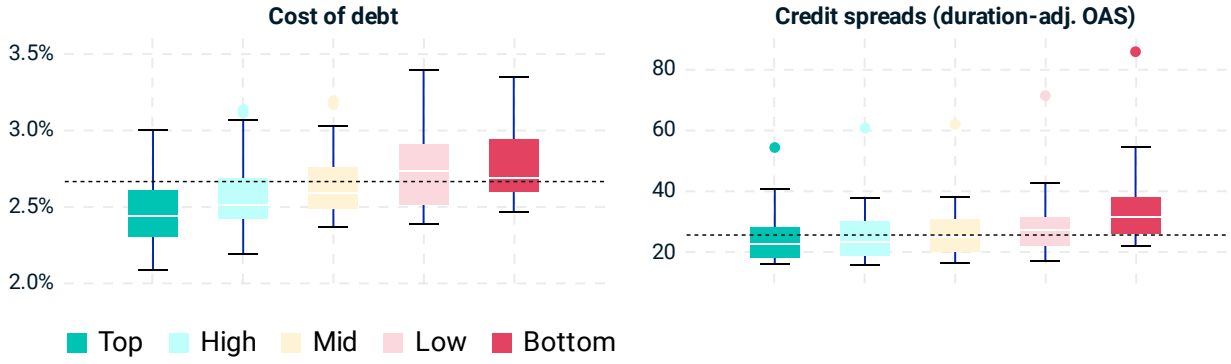
Exhibit 4: Cost of equity and stock beta across MSCI ESG Rating quintiles



Data period from August 2015 through May 2024. We divided the study sample (n = 4,315 unique issuers for cost of equity and n = 4,249 for beta) into quintiles each month based on IAS score, which underlies the MSCI ESG Rating, and compared each quintile's cost of equity and beta monthly (106 observations). Beta is predicted (local) beta, estimated using the long-term version of the MSCI Global Equity Model (GEMLT). The boxes outline the 25th to 75th percentile range, the line inside shows the median, the whiskers extend to the most extreme datapoints not considered outliers, and outliers are plotted as individual dots. The dotted line shows the average for the entire sample. The difference between the top and bottom quintiles was significant at a 99% confidence level using the Mann-Whitney U test. Source: MSCI ESG Research

The same results held for the reported cost of debt and its dynamic, market-determined proxy, which was the OAS on a company's senior bonds (Exhibit 5).

Exhibit 5: Cost of debt and credit spreads across MSCI ESG Rating quintiles

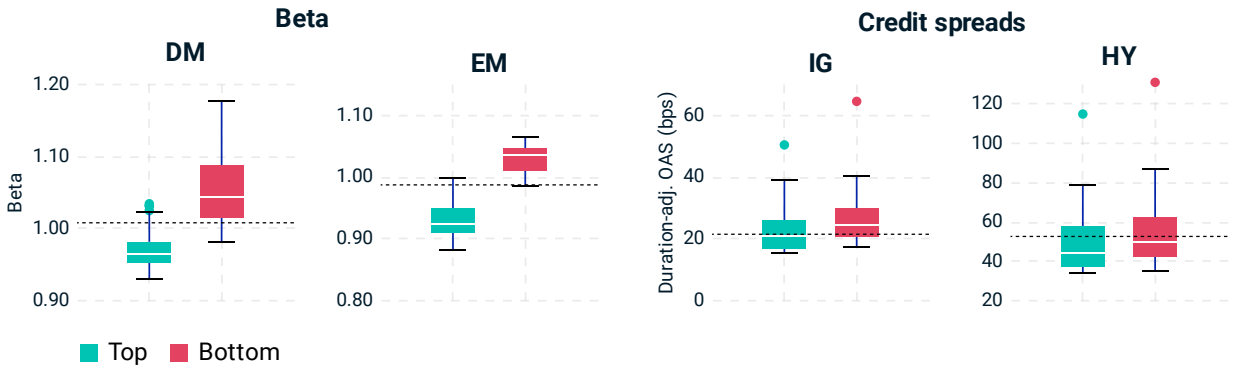


Data period from August 2015 through May 2024. We divided the study sample (n = 4,281 unique issuers for cost of debt and n = 2,252 for OAS) into quintiles each month based on IAS score, which underlies the MSCI ESG Rating, and compared each quintile's cost of debt and OAS monthly (106 observations). Credit spreads are adjusted for duration (OAS/modified duration). The boxes outline the 25th to 75th percentile range, the line inside shows the median, the whiskers extend to the most extreme datapoints not considered outliers, and outliers are plotted as individual dots. The dotted line shows the average for the entire sample. The difference between the top and bottom quintiles was significant at a 99% confidence level using the Mann-Whitney U test. Source: MSCI ESG Research

However, issuers may face dramatically different access to equity capital in developed markets (DM) and emerging markets (EM), and to debt financing based on whether their debt is considered investment grade (IG) or high yield (HY).[5]

But as Exhibit 6 shows, the results held in both DM and EM for the company-specific driver of the cost of equity – beta – and in both IG and HY for the company-specific marginal cost-of-debt proxy – credit spreads.

Exhibit 6: Beta (DM vs. EM) and credit spreads (IG vs. HY)



Data period from August 2015 through May 2024. We divided the study sample (n = 4,249 unique issuers for beta and n = 2,252 for OAS) into quintiles each month based on IAS score, which underlies the MSCI ESG Rating, and compared each quintile's beta for DM and EM and OAS for IG and HY monthly (106 observations). Beta is predicted (local) beta, estimated using the long-term version of the MSCI Global Equity Model (GEMLT). Credit spreads are adjusted for duration (OAS/modified duration). The boxes outline the 25th to 75th percentile range, the line inside shows the median, the whiskers extend to the most extreme datapoints not considered outliers, and outliers are plotted as individual dots. The dotted line shows the whole-sample average. The difference between the top and bottom quintiles was significant at a 99% confidence level using the Mann-Whitney U test. Source: MSCI ESG Research

Sector influence

We examined the differences in companies' funding costs within the same industry sectors.[6] Particularly in the equity markets, sector affiliation is one of the key drivers of risk and return, and investors rotate sectors to take advantage of changing market cycles; for example, investing in defensive sectors, such as consumer staples and health care, ahead of and through economic contractions, and investing in cyclical sectors, such as financials and information technology, when the economy is expanding.[7]

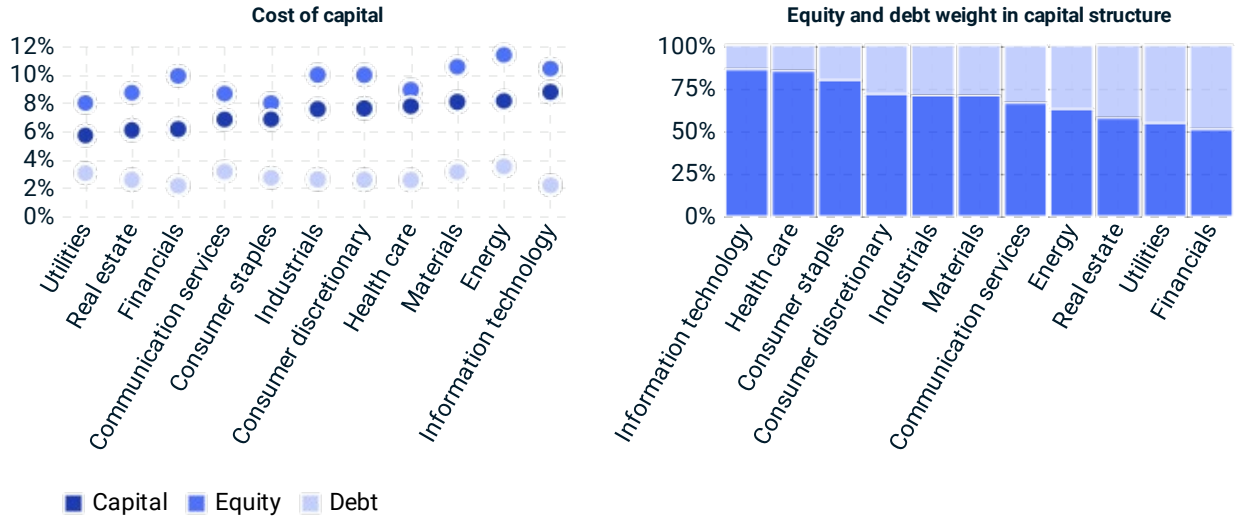
[5] For example, the MSCI Market Classification Framework requires a market to meet specific requirements in all three of the following categories to be classified in a given investment universe: 1) economic development, 2) size and liquidity and 3) market accessibility. Credit quality (as a proxy for default risk) is the key consideration for a company's marginal credit costs on top of market factors, such as prevailing interest rates, which are reflected in credit spreads (Vazza, Kraemer and Gurwitz 2019).

[6] Based on Global Industry Classification Standard (GICS®). GICS is the global industry classification standard jointly developed by MSCI and S&P Global Market Intelligence.

[7] For illustration, refer to MSCI Cyclical and Defensive Sectors Indexes, which is designed to track the performance of the opportunity set of global cyclical and defensive companies across various sectors.

We found notable differences in the financing structure among sectors. Some sectors, such as those with a large, tangible asset base, including financials, utilities and real estate, have been typically debt financed. Others, such as information technology and health care, have traditionally been financed through equity, related to their intangible assets and high growth potential (Exhibit 7).

Exhibit 7: Average cost of capital and funding structure by sector

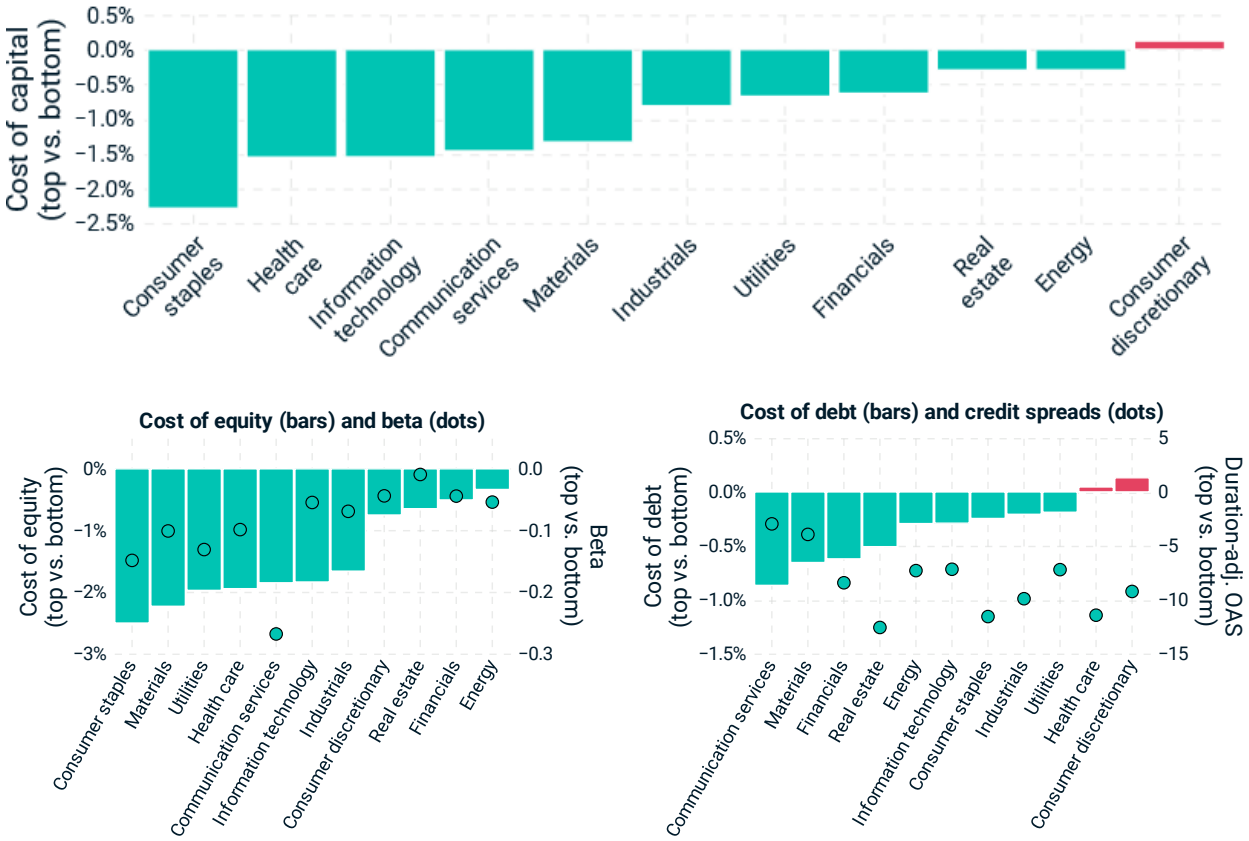


Data period from August 2015 through May 2024. We show the average values over the study period. Source: MSCI ESG Research

Still, companies with the highest MSCI ESG Ratings had significantly lower financing costs than lower-rated peers across sectors, except for the diverse consumer-discretionary sector (Exhibit 8). However, it is important to keep in mind that while the difference in financing costs was statistically significant in all sectors (except consumer discretionary), the economic significance may vary across sectors and over time (Appendix 5).

A similar relationship held for the highest-rated companies' costs of equity (all sectors) and debt (except for consumer discretionary and health care), confirmed by the company-specific market proxies (stock beta and credit spreads, respectively), both of which were lower for companies in the top ESG-rating quintile across all sectors.

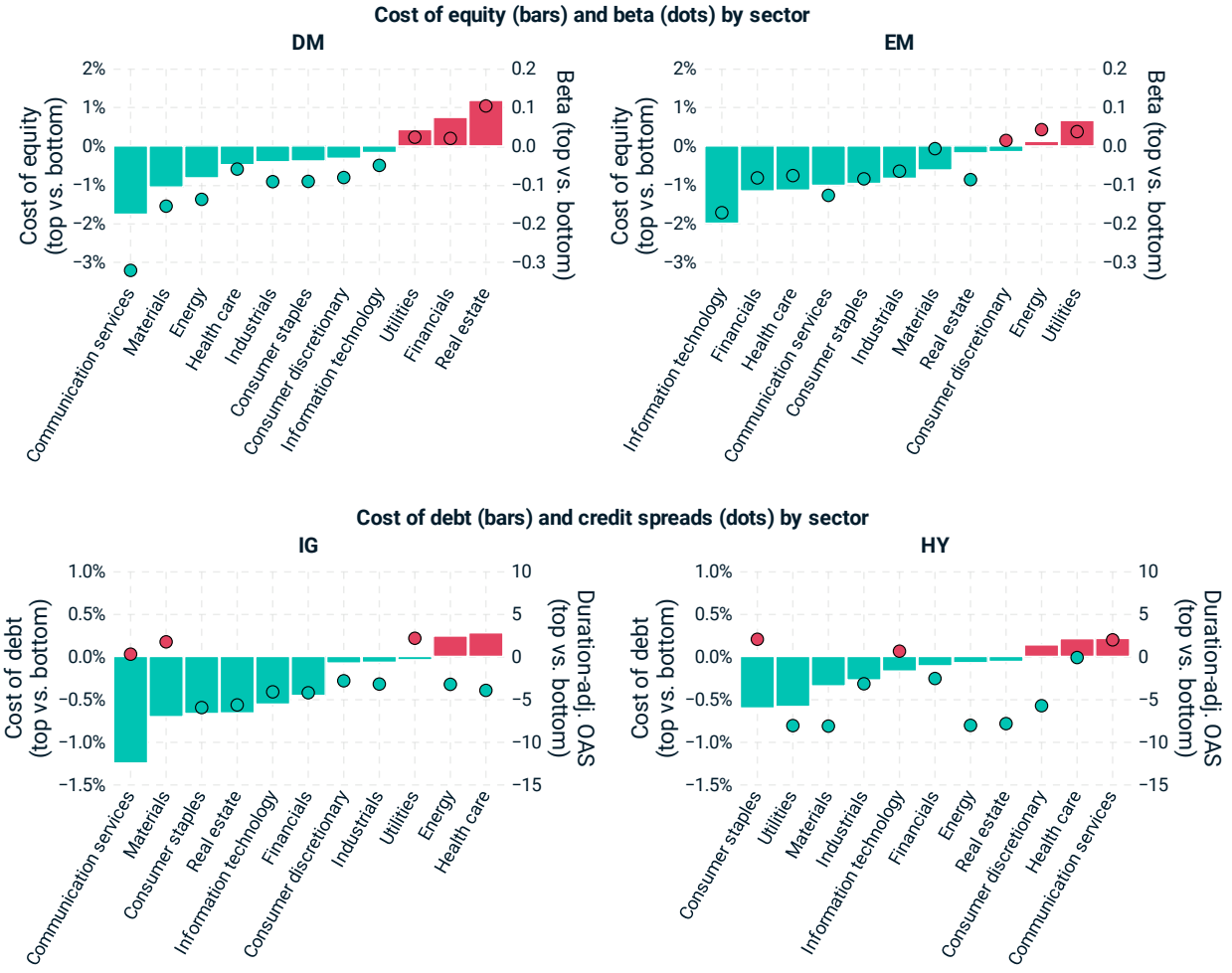
Exhibit 8: Cost-of-capital difference (top vs. bottom quintile) within sectors



Data period from August 2015 through May 2024. We show the difference within sectors during the study period (106 monthly observations). Beta is predicted (local) beta, estimated using the long-term version of the MSCI Global Equity Model (GEMLT). Credit spreads are adjusted for duration (OAS/modified duration). Please refer to Appendix 4 for the sample description data and the results of the Mann-Whitney U test on the statistical significance of the differences between the two samples. Source: MSCI ESG Research

Controlling for the key determinants of equity and debt financing costs — equity-market classification and credit quality, respectively — cost of equity and beta were still lower for the issuers with the highest MSCI ESG Ratings across most sectors in DM and EM (Exhibit 9). The highest-rated companies in most sectors also had a lower cost of debt and lower credit spreads, although the results' statistical significance was lower in the HY space, which was at least partly caused by much smaller sample sizes (Appendix 5).

Exhibit 9: Differences in cost of equity and debt within sectors



Data period from August 2015 through May 2024. We show the difference within sectors, controlling for equity-market classification and credit quality, during the study period (106 monthly observations). Beta is predicted (local) beta, estimated using the long-term version of the MSCI Global Equity Model (GEMLT). Credit spreads are adjusted for duration (OAS/modified duration). Please refer to Appendix 4 for the sample description data and the results of the Mann-Whitney U test on the statistical significance of the differences between the two samples. Source: MSCI ESG Research

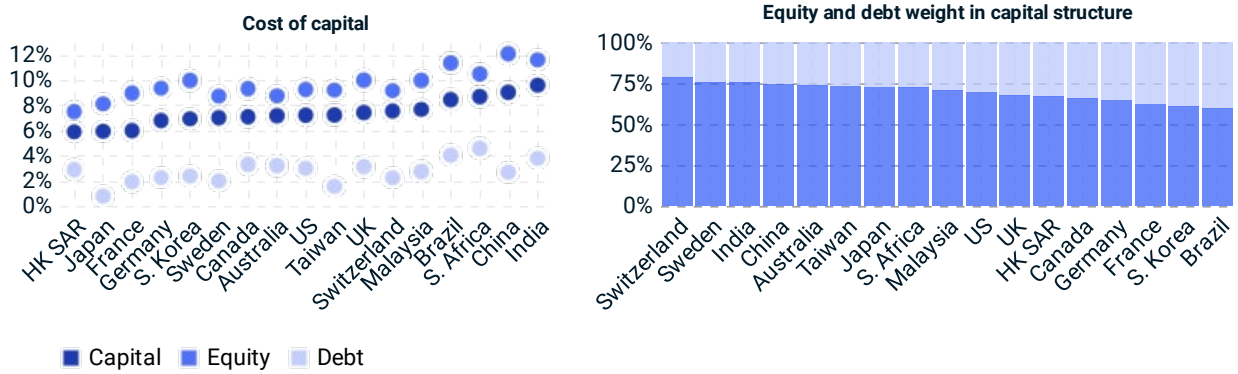
Influence of home market and funding currency

Analyzing differences in funding costs among companies within a single market can be particularly illuminating because each market has a unique economic, regulatory and financial system, which determines some of the key drivers of financing costs (e.g., the risk-free rate and the tax burden). Familiarity with local circumstances, among other factors, also leads to home bias by capital providers, such as retail and some institutional investors (e.g., pension funds) (Thinking Ahead Institute 2023).

So, we compared companies in the largest markets (based on the number of issuers in our study) across Asia-Pacific (APAC) (China, Japan, South Korea, India, Taiwan, Australia, Hong Kong SAR, Malaysia and Thailand), Europe, Middle East and Africa (EMEA) (U.K., France, Germany, Switzerland,

Sweden and South Africa) and the Americas (U.S., Canada and Brazil).[8] As Exhibit 10 shows, there were notable differences in financing structures and costs across these markets.

Exhibit 10: Average cost of capital and funding structure by home market



Data period from August 2015 through May 2024. We show the average values for all markets with at least 100 unique issuers to limit sample-size bias. Source: MSCI ESG Research

So, if companies in the same markets access similar sources of capital (e.g., banks or local investors) under similar basic conditions (e.g., same benchmark interest rate), the residual differences in their funding costs should mostly stem from differences in their risk profiles.

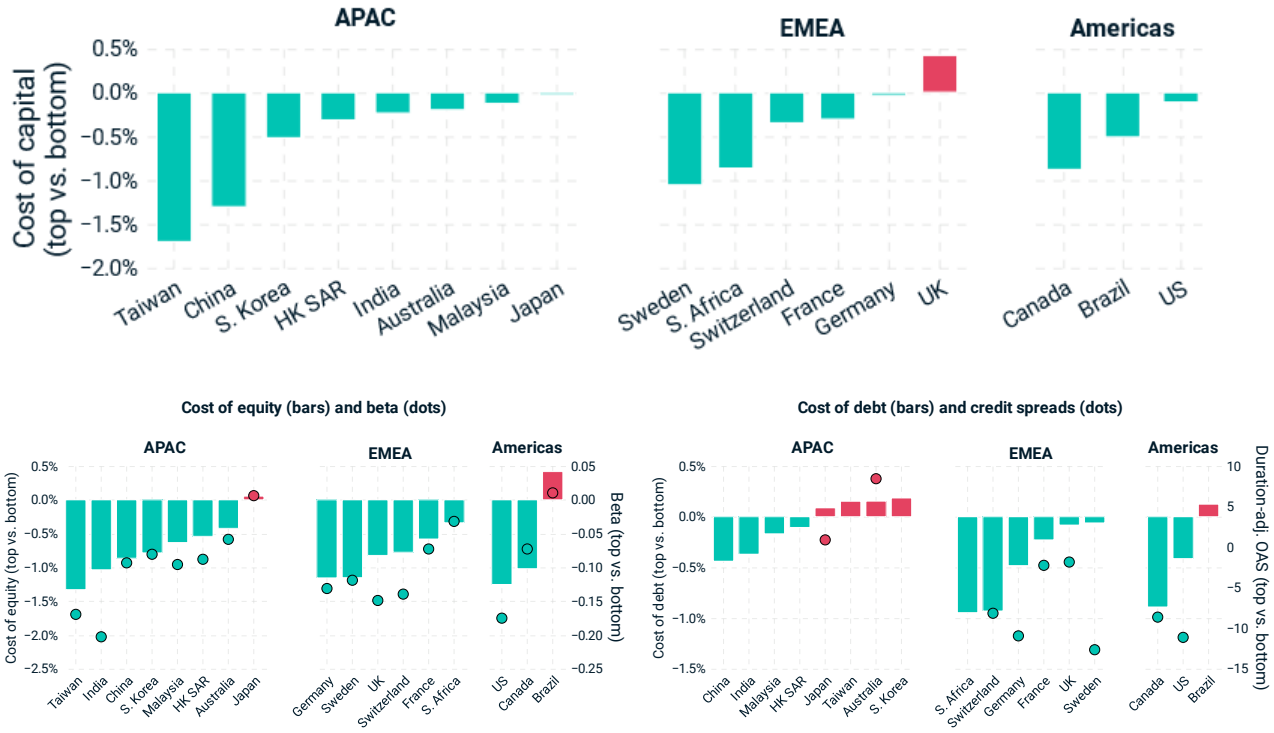
As Exhibit 11 shows, companies with the highest MSCI ESG Ratings had significantly lower funding costs than their peers across most markets. Our framework, which first checks the cost of capital, then its main components (equity and debt), and then their company-specific market proxies (beta and credit spreads), showed a relationship to the rating in most markets (see Appendix 2 for the underlying market-level data used in calculating the cost of capital).

In DM, Japan was the only market in which we found no significant difference between the companies in the top and bottom quintiles in both equity and debt. Japanese companies already enjoyed some of the lowest financing costs, especially in the debt markets, which perhaps left less space for further differentiation. The situation was more mixed in EM, particularly for debt, where our findings were at least partially driven by a smaller sample size (see Appendix 4).

In the debt space, particularly in the bond market, more determinative than the issuer's home market is the currency in which their bonds are denominated. Whereas most companies, especially in DM, list their equity in their home — and usually the main funding — currency, they can, and frequently do, issue bonds in multiple currencies to take advantage of market conditions and broaden their investor base (Maggiori, Neiman and Schreger 2023). Most importantly, the funding currency determines the bond's coupon rate or, from an investor's point of view, its yield to maturity (benchmark rate plus credit spread), as well as the credit spread, which varies in time across currencies (Hayes and Tokura 2021).

[8] We included markets with at least 50 unique issuers, based on our sample, over the study period to limit sample-size bias.

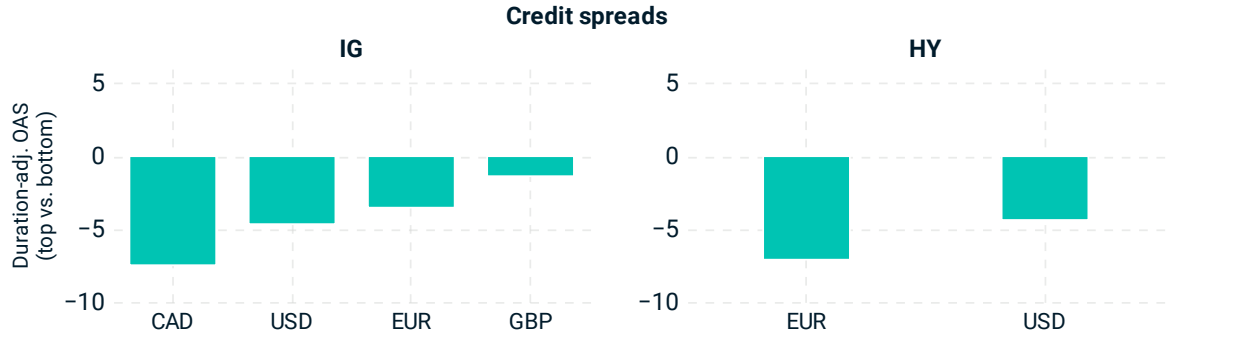
Exhibit 11: Cost-of-capital difference (top vs. bottom quintile) within a home market



Data period from August 2015 through May 2024. We show all markets with at least 50 unique issuers (to limit sample-size bias) during the study period (106 monthly observations). Beta is predicted (local) beta, estimated using the long-term version of the MSCI Global Equity Model (GEMLT). Credit spreads are adjusted for duration (OAS/modified duration). Please refer to Appendix 4 for the sample description data and the results of the Mann-Whitney U test on the statistical significance of the differences between the two samples. Source: MSCI ESG Research

Bonds of issuers with the highest MSCI ESG Ratings traded at a lower yield to maturity and credit spread (adjusted for duration) across currencies when compared to those of low-rated issuers, over our study period. Importantly, this relationship also held in all currencies after controlling for the issuer's credit quality (Exhibit 12).

Exhibit 12: Cost-of-capital difference (top vs. bottom quintile) by currency and credit-quality grade



Data period from August 2015 through May 2024. We show the difference for all currencies with at least 50 unique bonds sampled each month (to limit sample-size bias) during our study period (106 monthly observations). Credit spreads are adjusted for duration (OAS/modified duration). Please refer to Appendix 4 for the sample description data and the results of the Mann-Whitney U test on the statistical significance of the differences between the two samples. Source: MSCI ESG Research

This suggests that MSCI ESG Ratings could have provided further differentiation in credit costs even after controlling for credit ratings, which are one of the key decision-making tools for credit investors (Iannotta, Nocera and Resti 2013).

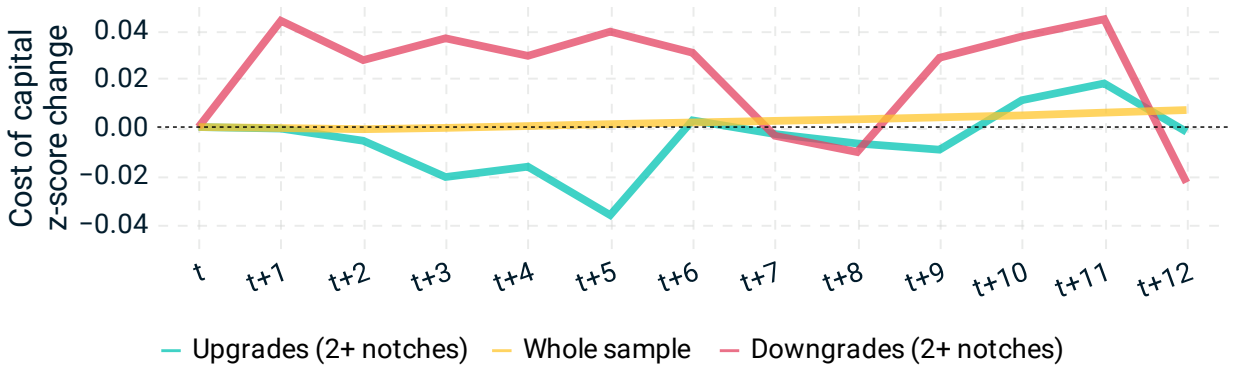
Did MSCI ESG Ratings provide a forward-looking signal?

Having observed statistically significant historical correlation and cross-sectional differences in financing costs related to a company's MSCI ESG Rating, we wanted to assess if a change in rating could have been a forward-looking indicator for the path of a company's cost of capital.

Although a small rating change (+/- one notch) did not show a notable pattern in the future change in the cost of capital, more-substantial rating changes (+/- two or more notches) seemed to have indicated more pronounced future changes in the cost of capital. For two or more notch upgrades, the company's cost of capital (turned into a z-score to neutralize the overall changes in the cost of capital) decreased further in the months following the rating upgrade. For two or more notch downgrades, the z-score for the cost of capital increased, indicating that the cost of capital of companies whose rating deteriorated more notably, increased relative to the sample (Exhibit 13).

This suggests that MSCI ESG Ratings may have been useful in capturing fundamental changes to the issuer's risk profile, related to sustainability or other significant events, such as eruption of major controversies and entering financial distress, that may have impacted their access to equity and debt capital.

Exhibit 13: Cost of capital after a substantial MSCI ESG Rating change



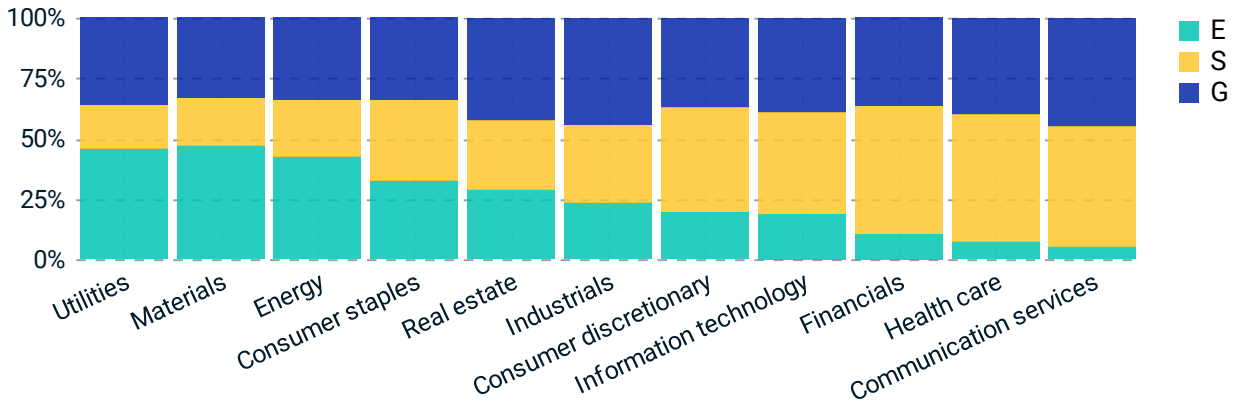
Data period from August 2015 through May 2024. We show the differences in the z-scores for the cost of capital (to neutralize the overall changes in the sample's cost of capital) during the 12 months after a substantial change in the MSCI ESG Rating (+/- two or more notches) during our study period (106 monthly observations). We did not observe a strong pattern for small rating changes (+/- one notch). Source: MSCI ESG Research

Looking at the individual pillars of MSCI ESG Ratings

Finally, we analyzed whether the individual drivers of the company's MSCI ESG Rating explained more of the past variations in the company's financing costs. Our motivation was that capital providers may place a higher weight on the main drivers of the issuer's risk profile to inform the expected return on their equity or debt investment. Such drivers could include resilience to environmental risks for environmentally intense industries, such as fossil fuels or mining, and social risks for those with direct impact on the consumer or other stakeholders, such as health-care or media companies.

These considerations are reflected in the weight-setting process for key issues in the construction of MSCI ESG Ratings, resulting in notable differences in the E, S and G pillar weights across industries and sectors (Exhibit 14).[9]

Exhibit 14: E, S and G pillar weights in MSCI ESG Ratings

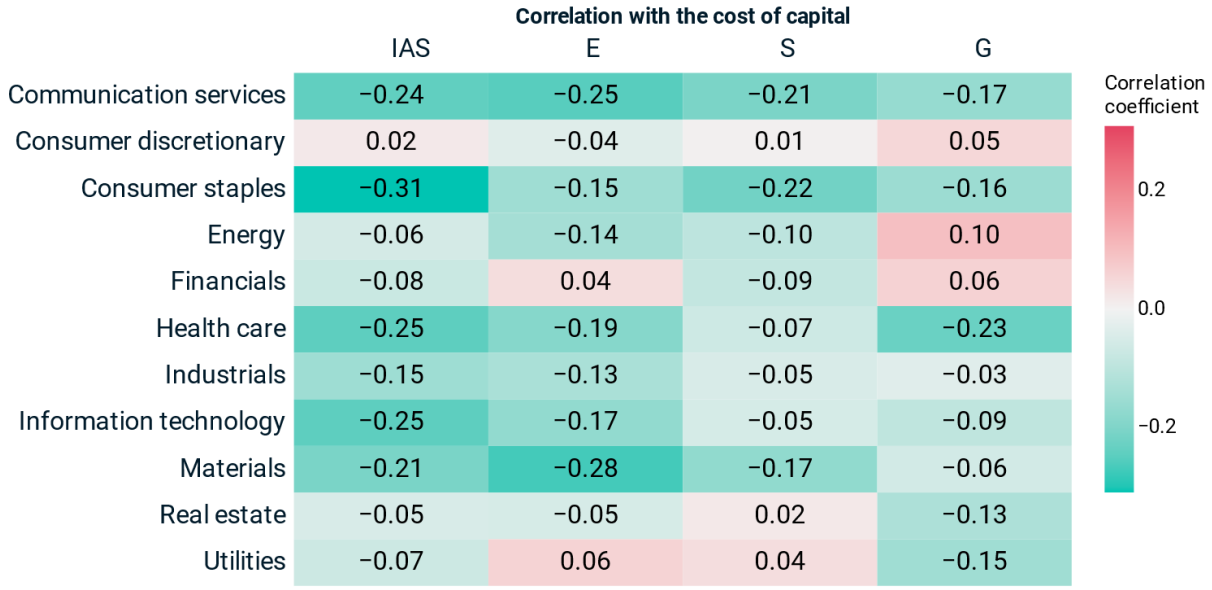


Data as of May 31, 2024. Source: MSCI ESG Research

In examining the correlations of the E, S and G pillar scores with the cost of capital in different sectors, we found mostly negative correlations (i.e., better assessment was correlated with lower financing costs). The overall assessment (as measured by the IAS score) showed a stronger correlation with the cost of capital than the individual pillars in most cases, suggesting that the overall profile may be more informative than its parts in isolation. This finding is supported by our previous research (e.g., Giese, Nagy and Lee 2021). There are, however, cases in which the individual risk drivers may be more relevant.

[9] MSCI ESG Ratings Methodology (June 2022)

Exhibit 15: Cost-of-capital correlation with the E, S and G pillar scores and overall score (IAS)



Data period from August 2015 through May 2024. We show the average values during our study period (106 monthly observations). The correlations were calculated using the IAS, which adjusts the issuer's performance on the relevant key issues relative to their global industry peers (scale 0-10) and underlies MSCI ESG Ratings (scale AAA to CCC), and the individual E, S, and G pillar scores (scale 0-10). Source: MSCI ESG Research

The relationships among sectors, pillars and the cost of capital can provide a clue as to what capital providers might consider to be the key risks for companies. The MSCI ESG Ratings model considers risks at a more granular level: within the pillars, key issues are selected at the industry level and weighted at the sub-industry level (see Appendix 5, and refer to the ESG Industry Materiality Map). Therefore, looking at relatively homogeneous sub-industries, which are highly exposed to environmental, social or governance issues particular to their business area, may offer an even better understanding of what drives a company's cost of capital.

For example, for the integrated oil and gas sub-industry, which houses the world's largest oil and gas companies, such as ExxonMobil Corp., PetroChina Co. Ltd., Saudi Aramco and Shell plc, the cost of capital was most correlated with their performance on the carbon emissions key issue (-0.21).[10] In the aerospace and defense industry — including companies such as Airbus SE, Boeing Co. and Lockheed Martin Corp.— the strongest correlation was in the product safety and quality assessment (-0.30); Boeing's aircraft safety incidents with the 737 MAX provide a clear example of why investors might consider this key issue important.

[10] The carbon emissions key issue focuses on the extent to which companies operate in jurisdictions where regulations on carbon emissions are stringent or becoming more stringent and the extent to which a company's main business activities are carbon intensive based on an economic input-output model that estimates total greenhouse-gas emissions relative to sales. In terms of management, the focus is on efforts to reduce exposure through comprehensive carbon policies and implementation mechanisms, including carbon-reduction targets, production-process improvements and installation of depollution or emissions-capture equipment, and switching to cleaner energy sources (MSCI ESG Ratings Methodology 2022).

For construction-materials companies, such as cement producers Holcim Ltd. and Cemex, the cost of capital was strongly correlated with scores on carbon emissions (-0.27) and toxic emissions and waste (-0.20), both of which are prominent issues and potential sources of transition and regulatory risks in the hard-to-abate industry. The cost of capital for companies in the semiconductors sub-industry — including both chip design and production giants such as Nvidia Corp., Intel Corp. and TSMC Co. Ltd. — was most correlated with water stress (-0.25); controversial sourcing, which considers risks relating to conflict minerals in supply chains (-0.35); and the human-capital-development key issue (-0.14), all of which are important themes in the industry.

There were also industries for which we did not find an intuitive link between the most prominent financially material sustainability risks and their financing costs. For example, for utilities, environmental key issues, such as carbon emissions or the use of natural capital, did not seem to play a pivotal role in the cost of capital, while the governance assessment showed the strongest negative correlation (-0.14).[11] This could potentially be tied to the risks related to the strong government (ownership) presence in this highly regulated industry (Kovvali and Macey 2023).

For pharmaceuticals, financing costs did not seem to be driven, on average, by their product-safety assessment. This could suggest a focus on other risk and return drivers, such as the supervision and quality of a company's management and workforce, critical in an industry that requires a highly skilled workforce, evidenced by a strong negative correlation with governance (-0.27) and human-capital assessment (-0.32).

As Giese, Nagy and Lee (2020) explained, sustainability-related risks materialize as "event" and "erosion" risks to a company's long-term competitiveness. They identified environmental issues as being erosion-driven (unfolding over time), and social issues showed a mix of event-driven and erosion-driven characteristics, while governance issues had the highest share of event risks. Therefore, environment, social and governance risks can manifest and affect companies over different time horizons and with different intensities, which may play a key role in understanding how the information contained in a company's MSCI ESG Rating may influence its financial performance, including its cost of capital.

[11] Refer to Appendix 6 for details on which key issues are included in the natural-capital theme in the environmental pillar of the MSCI ESG Ratings.

Conclusion

We identified a strong relationship between a company's MSCI ESG Rating and its cost of capital, wherein companies with higher ratings benefited from a consistently lower cost of capital during our study period. We observed this relationship in both the costs of equity and debt and in their company-specific, dynamic market proxies — beta in the stock market and credit spreads in the bond market.

These results held when controlling for market-wide factors, such as the issuer's home market, sector or credit quality, to isolate the residual effect of the difference in the company's MSCI ESG Rating.

To turn the historical correlation into a forward-looking indicator, we tested if changes in a company's MSCI ESG Rating had provided a signal for the future path of the company's financing costs. Significant rating changes indeed showed a directional pattern in the future financing costs.

Finally, for some industries, it may prove beneficial to look at the individual component drivers of their rating, as investors and other providers of capital may place higher weight on what they consider to be the industry's most significant sustainability-related risk and return drivers.

Appendix

Appendix 1: Cost-of-capital calculation (methodology)

Cost of capital

Weighted-average cost of capital (WACC) is calculated using the following formula:

$$WACC = K(e) * W(e) + K(d) * W(d) + K(p) * W(p),$$

where *K(e)* is the cost and *W(e)* the weight of equity, *K(d)* and *W(d)* the cost and weight of debt, and *K(p)* and *W(p)* the cost and weight of preferred equity in the issuer's capital structure. Weights are calculated at the issuer level.

Cost of equity

Cost of equity is calculated using the following capital asset pricing model (CAPM)-based formula:

$$K(e) = RFR + \beta * ERP,$$

where *RFR* is the risk-free rate, *β* is the stock's predicted (local) beta using the long-term version of MSCI Global Equity Model (GEMLT) and *ERP* is the equity risk premium calculated for each market.[12]

$$ERP = Expected\ market\ returns - RFR = D + g - RFR$$

$$D = Predicted\ earning\ yield * Payout\ ratio$$

$$Predicted\ earning\ yield = \frac{1}{Index\ level\ PE\ Forward}$$

$$Payout\ ratio = \frac{ROE - g}{ROE}$$

$$ROE = Index\frac{level\frac{P}{BV}}{index\ level\ PE\ Forward},$$

where *g* is the five-year nominal GDP growth-rate forecast for each market.

The role of a stock's beta in the cost of equity

Investors can typically diversify away firm-specific risk, but systematic risk, which includes country- and industry-wide issues such as regulatory and technological developments, cannot be easily lowered through security selection. In the equity market, systematic risk is the sole component that determines an investor's required rate of return as compensation for the risk they are undertaking. This required rate of return is the cost of equity, a major component of the overall cost of capital.

In a CAPM model framework (Ruefli, Collins and Lacugna 1999), the stock's **beta (*β*) measures systematic risk exposure and translates the equity risk premium into the required rate of return for the company**. Therefore, a lower beta not only directly leads to a lower rate of return required by

[12] Market-level data is used in a company's cost-of-capital calculation, matching their exposure to the country or region (Appendix 2).

investors, but it is also the only component of the cost-of-equity formula that considers the company's own characteristics, such as its business or geographical footprint.

Therefore, to examine the impact of business characteristics, such as resilience to sustainability-related risks, on a company's cost of equity (and proportionately on the cost of capital), we believe it may be informative to separately examine its systematic-risk exposure measured by the stock's beta.

Cost of debt

Cost of debt is based on a fundamental data-collection approach, using the following formula:

$$K(d) = \frac{INT}{TD} * (1 - T)\ ,$$

where *INT* is the interest expense on debt, *TD* is total debt and *T* is the relevant corporate tax rate.

The impact of the company's credit quality on the cost of debt

As with equity, it is critical to understand and differentiate between company-specific and market-wide factors that influence a company's cost of debt. The bulk of the interest costs are driven by the risk-free rate in the debt's denomination currency, whereas the tax rate depends on the tax domicile.

Beyond these market-wide factors, a company's creditworthiness is the key company-specific determinant of its borrowing costs because creditors demand adequate compensation for the counterparty-default risk they are exposing themselves to (O'Kane 2005).

A model-based measure of the issuer's credit risk is the credit rating, which has been shown to exhibit a strong correlation to credit costs (Vazza, Kraemer and Gurwitz 2019). As a model-independent measure, Mendiratta, Varsani and Giese (2021) argued that in the **bond market,** the **cost of debt can be approximated by the average credit spread of an issuer's outstanding bonds**. Although the credit spread does not represent the total borrowing cost for an issuer, but only the credit risk add-on to the relevant benchmark interest rate, the spread should reflect the issuer's risk profile, including its resilience to sustainability-related risks.

Therefore, to examine the impact of concrete business characteristics on a company's cost of debt (and proportionately on the cost of capital), we assess how it relates to the issuer's credit quality and market pricing of its default risk through credit spreads.

Dynamic, market-determined credit spreads also help us overcome a shortcoming of the cost-of-debt formula and resulting data; that is, while they capture a company's total debt-servicing costs, it relies on company-reported data from financial statements, which are published infrequently — often annually — and might therefore be slow to reflect changes in the company's risk profile.

Appendix 2: Cost-of-capital calculation (underlying data)

Market-level data underlying the cost-of-capital calculation								
Region	Market classification	Market	Number of issuers	Cost of capital	Cost of equity	Weight of equity	Cost of debt	Weight of debt
APAC	DM	Japan	371	6.0%	8.2%	72.5%	0.8%	27.4%
		Australia	87	7.2%	8.8%	73.4%	3.2%	26.5%
		Hong Kong SAR	57	5.9%	7.5%	67.1%	2.9%	32.9%
	EM	China	644	9.0%	12.1%	74.4%	2.7%	25.5%
		South Korea	157	6.9%	10.0%	60.8%	2.4%	39.2%
		India	146	9.6%	11.6%	75.2%	3.8%	24.8%
		Taiwan	121	7.3%	9.3%	73.1%	1.6%	26.9%
		Malaysia	53	7.7%	10.0%	70.5%	2.8%	29.3%
EMEA	DM	U.K.	175	7.4%	10.0%	67.6%	3.1%	32.4%
		France	97	6.0%	9.0%	62.3%	1.9%	37.7%
		Germany	96	6.8%	9.4%	64.7%	2.3%	35.3%
		Switzerland	56	7.5%	9.2%	78.3%	2.3%	21.7%
		Sweden	53	7.1%	8.8%	75.5%	2.0%	24.5%
	EM	South Africa	51	8.7%	10.5%	72.3%	4.6%	27.6%
Americas	DM	U.S.	1,212	7.2%	9.3%	69.3%	3.0%	30.3%
		Canada	164	7.1%	9.3%	64.8%	3.3%	34.1%
	EM	Brazil	80	8.5%	11.4%	59.5%	4.1%	40.5%

Market-level data underlying the cost-of-capital calculation									
Region	Market classification	Market	Risk-free rate	Beta	Equity risk premium	GDP forecast (5y)	ROE	P/E	P/BV
APAC	DM	Japan	0.1%	1.01	7.9%	4.0%	9.2%	14.1	1.3
		Australia	1.5%	1.02	7.2%	4.7%	12.7%	16.0	2.0
		Hong Kong SAR	1.5%	0.97	6.2%	5.1%	8.2%	14.6	1.2
	EM	China	2.4%	1.00	9.2%	7.8%	13.5%	11.5	1.6
		South Korea	1.9%	1.00	8.2%	5.0%	10.6%	10.3	1.1
		India	6.1%	1.06	5.1%	9.0%	16.0%	19.7	3.2
		Taiwan	1.1%	0.97	8.4%	4.9%	14.0%	14.4	2.0
		Malaysia	3.1%	1.04	6.6%	8.7%	10.2%	15.2	1.6
EMEA	DM	U.K.	1.1%	1.08	8.2%	4.0%	13.6%	13.9	1.9
		France	0.1%	1.04	8.6%	4.2%	11.8%	14.5	1.7
		Germany	0.2%	1.02	9.2%	4.5%	12.3%	13.3	1.6
		Switzerland	-0.2%	1.05	8.8%	4.2%	16.4%	17.3	2.8
		Sweden	0.5%	1.03	8.4%	5.2%	13.1%	16.6	2.2
	EM	South Africa	6.3%	0.92	4.4%	4.2%	16.7%	11.9	2.0
Americas	DM	U.S.	1.7%	1.14	6.6%	4.2%	18.3%	18.9	3.5
		Canada	1.4%	1.03	7.7%	5.0%	12.8%	14.9	1.9
	EM	Brazil	5.5%	0.94	6.4%	5.0%	16.8%	10.9	1.8

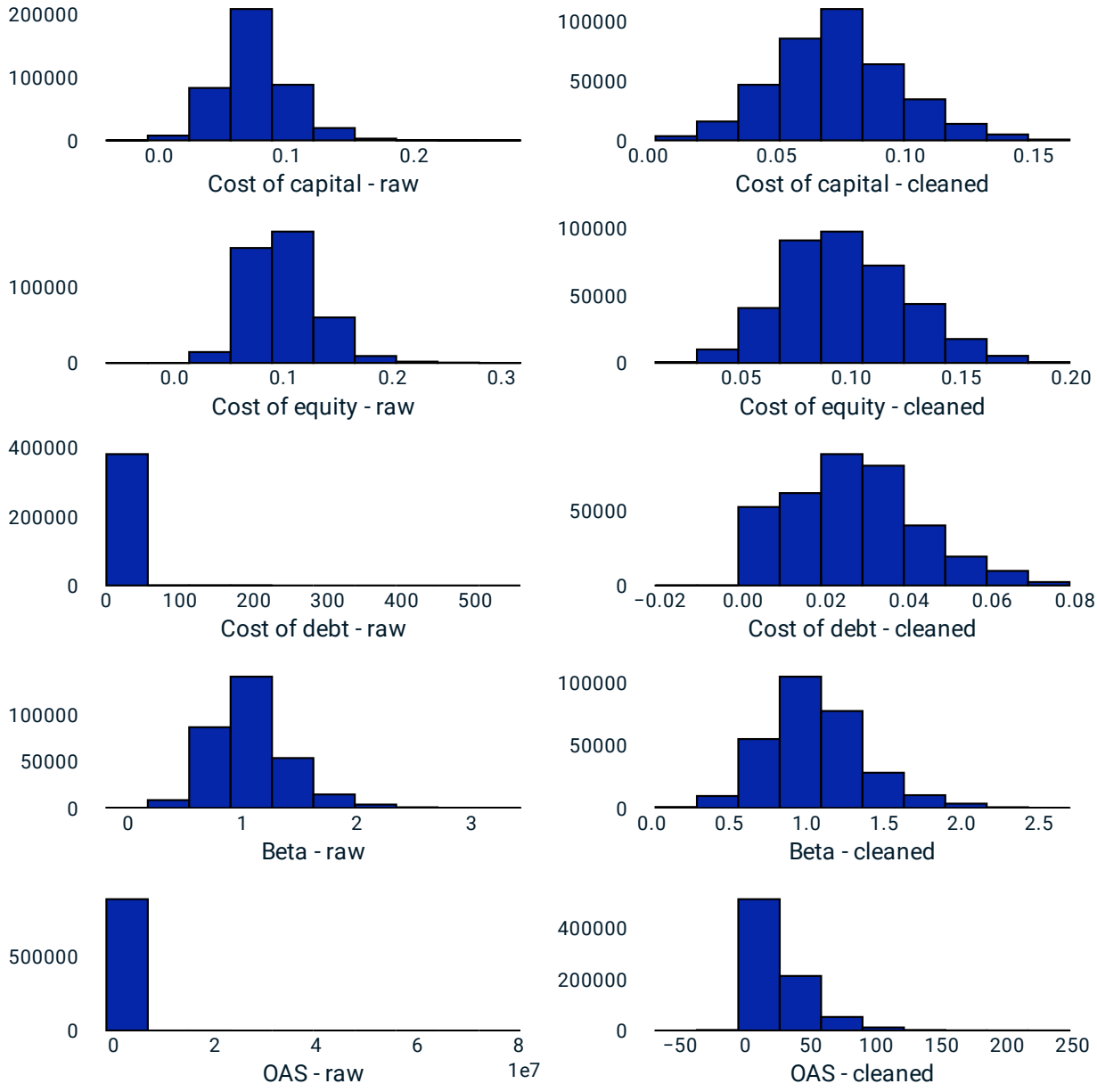
Data period from August 2015 through May 2024. The number of issuers is the number of unique issuers in each market included in our study. The values shown are the average of monthly values for each indicator over the study period. The beta is predicted (local) beta, estimated using the long-term version of the MSCI Global Equity Model (GEMLT). The five-year GDP forecast is based on the International Monetary Fund's (IMF) World Economic Outlook. Source: MSCI ESG Research

Appendix 3: Data cleaning

We removed outliers from our datasets using the interquartile-range (IQR) method. We applied it on the cost of capital, cost of equity, cost of debt, beta and credit spread (OAS) data. Outliers were defined as the observations that appeared outside the (Q1–1.5 * IQR) or (Q3 + 1.5 * IQR) bound, where IQR is the interquartile range between the 25th and 75th percentile.

With the IQR method, we removed, on average, 7.1% cases monthly and, therefore, four unique issuers in the historical coverage, which led to our final dataset of 4,319 unique issuers.

Distribution of data in the raw and cleaned datasets



Data as of May 31, 2024. Source: MSCI ESG Research

Appendix 4: Mann-Whitney U test

The Mann-Whitney U test is a nonparametric statistical test that compares two independent samples, without any assumptions about their distribution. It compares the data in the groups to determine whether the groups' distributions differ significantly (i.e., if one group tended to have higher or lower values than the other).

We opted for a nonparametric test because the cost-of-capital data we studied was not normally distributed (illustration in Appendix 3).

We ran the Mann-Whitney U tests with the following hypotheses:

> *H_0: Top-quintile issuers had identical test variable as the bottom-quintile issuers.*
>
> *H_A: Top-quintile issuers had lower test variable than the bottom-quintile issuers.*

Test variables included cost of capital, cost of equity, cost of debt and our company-specific market proxies for each — the stock beta and the credit spread (OAS) on an issuer's senior bonds.

To control for the effect of other potentially influential variables, we ran the test for each group defined by the control variables — namely, market classification, credit-quality grade, sector, home market, funding currency and credit rating. Within these groups, we recalculated ESG quintiles based on the issuer's industry-adjusted score (IAS), which secured an acceptable number of issuers in each group (Appendix 5).

The results of the one-sided Mann-Whitney U tests are presented in Appendix 5, p-values indicate whether the H_0 can be rejected. *** indicates 99%, ** 95% and * 90% confidence level of rejecting H_0.

Appendix 5: Cost-of-capital comparison

Home markets

Cost of capital								
Region	Market classification	Market	Number of issuers	Cost of capital	Cost of capital (Top quintile)	Cost of capital (Bottom quintile)	Difference (Top - Bottom)	p-value (significance)
APAC	DM	Japan	371	6.0%	6.1%	6.1%	0.0%	p = 0.009***
		Australia	87	7.2%	7.2%	7.4%	-0.2%	p = 0.000***
		Hong Kong SAR	57	5.9%	5.7%	6.0%	-0.3%	p = 0.005***
	EM	China	644	9.0%	8.4%	9.7%	-1.3%	p = 0.000***
		South Korea	157	7.0%	6.5%	7.0%	-0.5%	p = 0.000***
		India	146	9.6%	9.4%	9.7%	-0.2%	p = 0.000***
		Taiwan	121	7.2%	5.9%	7.6%	-1.7%	p = 0.000***
		Malaysia	53	7.7%	7.4%	7.6%	-0.1%	p = 0.052*
EMEA	DM	U.K.	175	7.5%	7.6%	7.2%	0.4%	p = 1.000
		France	97	6.0%	6.0%	6.3%	-0.3%	p = 0.000***
		Germany	96	6.8%	7.0%	7.0%	0.0%	p = 0.251
		Switzerland	56	7.6%	7.8%	8.1%	-0.3%	p = 0.004***
		Sweden	53	7.1%	6.3%	7.3%	-1.1%	p = 0.000***
	EM	South Africa	51	8.7%	8.1%	8.9%	-0.9%	p = 0.000***
Americas	DM	U.S.	1,212	7.2%	7.1%	7.2%	-0.1%	p = 0.002***
		Canada	164	7.1%	6.4%	7.3%	-0.9%	p = 0.000***
	EM	Brazil	80	8.5%	8.4%	8.9%	-0.5%	p = 0.000***

Cost of equity								
Region	Market classification	Market	Number of issuers	Cost of capital	Cost of capital (Top quintile)	Cost of capital (Bottom quintile)	Difference (Top - Bottom)	p-value (significance)
APAC	DM	Japan	371	8.1%	8.2%	8.2%	0.1%	p = 0.994
		Australia	87	8.8%	8.6%	9.1%	-0.4%	p = 0.000***
		Hong Kong SAR	57	7.5%	7.3%	7.8%	-0.5%	p = 0.000***
	EM	China	643	12.1%	11.2%	12.1%	-0.9%	p = 0.000***
		South Korea	157	10.0%	9.4%	10.1%	-0.8%	p = 0.000***
		India	146	11.6%	10.9%	11.9%	-1.0%	p = 0.000***
		Taiwan	121	9.2%	8.1%	9.4%	-1.3%	p = 0.000***
		Malaysia	53	10.0%	9.7%	10.3%	-0.6%	p = 0.000***
EMEA	DM	U.K.	175	10.0%	9.8%	10.6%	-0.8%	p = 0.000***
		France	97	9.0%	9.0%	9.6%	-0.6%	p = 0.000***
		Germany	96	9.4%	8.9%	10.0%	-1.2%	p = 0.000***
		Switzerland	56	9.2%	9.0%	9.8%	-0.8%	p = 0.000***
		Sweden	53	8.8%	7.7%	8.9%	-1.2%	p = 0.000***
	EM	South Africa	51	10.5%	10.3%	10.6%	-0.3%	p = 0.036**
Americas	DM	U.S.	1212	9.3%	8.5%	9.7%	-1.3%	p = 0.000***
		Canada	164	9.3%	8.6%	9.6%	-1.0%	p = 0.000***
	EM	Brazil	80	11.4%	12.0%	11.6%	0.4%	p = 0.996

Beta					
Number of stocks	Beta	Beta (Top quintile)	Beta (Bottom quintile)	Difference (Top - Bottom)	p-value (significance)
371	1.01	1.02	1.01	0.01	p = 0.965
86	1.02	1.00	1.05	-0.06	p = 0.000***
55	0.97	0.92	1.01	-0.09	p = 0.000***
621	1.00	0.94	1.04	-0.09	p = 0.000***
157	1.00	0.94	1.02	-0.08	p = 0.000***
146	1.06	0.93	1.13	-0.20	p = 0.000***
121	0.97	0.82	0.99	-0.17	p = 0.000***
53	1.04	1.00	1.10	-0.10	p = 0.000***
171	1.08	1.04	1.19	-0.15	p = 0.000***
96	1.04	1.03	1.10	-0.07	p = 0.000***
90	1.02	0.96	1.09	-0.13	p = 0.000***
55	1.05	1.01	1.15	-0.14	p = 0.000***
52	1.03	0.91	1.03	-0.12	p = 0.000***
51	0.92	0.90	0.93	-0.03	p = 0.599
1204	1.14	1.04	1.21	-0.18	p = 0.000***
161	1.03	0.95	1.02	-0.07	p = 0.000***
79	0.94	0.96	0.95	0.01	p = 0.998

Cost of debt								
Region	Market classification	Market	Number of issuers	Cost of capital	Cost of capital (Top quintile)	Cost of capital (Bottom quintile)	Difference (Top - Bottom)	p-value (significance)
APAC	DM	Japan	370	0.8%	0.9%	0.8%	0.1%	p = 1.000
		Australia	84	3.2%	3.2%	3.1%	0.2%	p = 0.999
		Hong Kong SAR	57	2.9%	2.7%	2.8%	-0.1%	p = 0.988
	EM	China	637	2.7%	2.4%	2.8%	-0.4%	p = 0.000***
		South Korea	157	2.4%	2.4%	2.2%	0.2%	p = 1.000
		India	145	3.8%	3.5%	3.8%	-0.4%	p = 0.000***

Credit spreads (duration-adj. OAS in bps)					
Number of bonds	OAS	OAS (Top quintile)	OAS (Bottom quintile)	Difference (Top - Bottom)	p-value (significance)
1,220	13	25	24	1	p = 1.000
664	28	36	27	8	p = 1.000
165	28	32	42	-10	p = 0.000***
581	19	41	36	5	p = 1.000
500	12	35	43	-8	p = 0.000***
98	45	40	47	-7	p = 0.001***

		Taiwan	120	1.6%	1.7%	1.5%	0.2%	p = 0.069*	-	-	-	-	-	-
		Malaysia	53	2.8%	2.6%	2.8%	-0.2%	p = 0.004***	87	5	39	37	2	p = 0.978
EMEA	DM	U.K.	175	3.1%	3.0%	3.1%	-0.1%	p = 0.011**	2,420	26	26	28	-2	p = 0.001***
		France	97	2.0%	1.8%	2.0%	-0.2%	p = 0.000***	2,030	24	25	28	-2	p = 0.000***
		Germany	96	2.3%	2.0%	2.5%	-0.5%	p = 0.000***	1,853	24	21	32	-11	p = 0.000***
		Switzerland	56	2.3%	2.2%	3.1%	-0.9%	p = 0.000***	504	21	22	30	-8	p = 0.000***
		Sweden	53	2.0%	1.9%	1.9%	-0.1%	p = 0.006***	376	30	23	36	-13	p = 0.000***
	EM	South Africa	50	4.6%	4.3%	5.2%	-0.9%	p = 0.000***	-	-	-	-	-	-
Americas	DM	U.S.	1208	3.0%	2.8%	3.2%	-0.4%	p = 0.000***	16,328	26	21	32	-11	p = 0.000***
		Canada	164	3.3%	2.7%	3.6%	-0.9%	p = 0.000***	2,314	25	25	34	-9	p = 0.000***
	EM	Brazil	77	4.1%	4.1%	4.0%	0.1%	p = 0.984	171	42	62	48	15	p = 1.000

*Data period from August 2015 through May 2024. We show the differences among issuers (equal-weighted) in the top and bottom quintiles during the study period (106 monthly observations). China includes issuers listed in Hong Kong SAR. The (historical) stock beta was derived using the MSCI Multi-Asset Class (MAC) Factor Model in MSCI's BarraOne® risk- and portfolio-management analytics platform. Credit spreads are adjusted for duration (OAS/modified duration). *** indicates 99%, ** 95% and * 90% confidence level of rejecting the H_0 that there is no difference between the two samples using the Mann-Whitney U test. Source: MSCI ESG Research*

Sectors

Cost of capital						
GICS sector	Number of issuers	Cost of capital	Cost of capital (Top quintile)	Cost of capital (Bottom quintile)	Difference (Top - Bottom)	p-value (significance)
Communication services	252	6.8%	6.0%	7.5%	-1.5%	p = 0.000***
Consumer discretionary	620	7.6%	7.7%	7.6%	0.1%	p = 1.000
Consumer staples	318	6.8%	5.6%	7.9%	-2.3%	p = 0.000***
Energy	241	8.2%	8.1%	8.4%	-0.3%	p = 0.000***
Financials	672	6.2%	5.8%	6.4%	-0.6%	p = 0.000***
Health care	333	7.8%	7.2%	8.7%	-1.6%	p = 0.000***
Industrials	778	7.6%	7.3%	8.1%	-0.8%	p = 0.000***
Information technology	553	8.8%	8.2%	9.8%	-1.5%	p = 0.000***
Materials	454	8.1%	7.4%	8.7%	-1.3%	p = 0.000***
Real estate	263	6.1%	6.0%	6.3%	-0.3%	p = 0.000***
Utilities	189	5.8%	5.4%	6.1%	-0.7%	p = 0.000***

Cost of equity						
GICS sector	Number of issuers	Cost of capital	Cost of capital (Top quintile)	Cost of capital (Bottom quintile)	Difference (Top - Bottom)	p-value (significance)
Communication services	252	8.7%	7.6%	9.4%	-1.9%	p = 0.000***
Consumer discretionary	620	10.0%	9.5%	10.3%	-0.8%	p = 0.000***
Consumer staples	318	8.0%	6.6%	9.1%	-2.5%	p = 0.000***
Energy	239	11.4%	11.2%	11.5%	-0.3%	p = 0.000***
Financials	671	9.9%	9.7%	10.2%	-0.5%	p = 0.000***
Health care	333	8.9%	7.9%	9.8%	-1.9%	p = 0.000***
Industrials	778	10.0%	9.1%	10.7%	-1.7%	p = 0.000***
Information technology	553	10.4%	9.5%	11.3%	-1.8%	p = 0.000***
Materials	453	10.6%	9.1%	11.4%	-2.2%	p = 0.000***
Real estate	263	8.7%	8.5%	9.2%	-0.6%	p = 0.000***
Utilities	189	8.0%	7.1%	9.1%	-2.0%	p = 0.000***

Beta					
Number of stocks	Beta	Beta (Top quintile)	Beta (Bottom quintile)	Difference (Top - Bottom)	p-value (significance)
243	0.95	0.82	1.08	-0.27	p = 0.000***
592	1.14	1.09	1.13	-0.04	p = 0.000***
313	0.77	0.70	0.85	-0.15	p = 0.000***
228	1.32	1.29	1.34	-0.05	p = 0.000***
663	1.07	1.06	1.10	-0.04	p = 0.000***
328	0.95	0.89	0.99	-0.10	p = 0.000***
750	1.10	1.04	1.10	-0.07	p = 0.000***
520	1.14	1.12	1.18	-0.06	p = 0.000***
443	1.13	1.05	1.15	-0.10	p = 0.000***
252	0.97	0.98	0.99	-0.01	p = 0.353
183	0.78	0.75	0.88	-0.13	p = 0.000***

Cost of debt						
GICS sector	Number of issuers	Cost of capital	Cost of capital (Top quintile)	Cost of capital (Bottom quintile)	Difference (Top - Bottom)	p-value (significance)
Communication services	251	3.2%	2.6%	3.5%	-0.9%	p = 0.000***
Consumer discretionary	619	2.6%	2.6%	2.4%	0.1%	p = 1.000
Consumer staples	317	2.7%	2.5%	2.8%	-0.2%	p = 0.000***
Energy	239	3.5%	3.3%	3.6%	-0.3%	p = 0.000***

Credit spreads (duration-adj. OAS in bps)					
Number of bonds	OAS	OAS (Top quintile)	OAS (Bottom quintile)	Difference (Top - Bottom)	p-value (significance)
3,794	25	24	27	-3	p = 0.000***
6,324	26	23	32	-9	p = 0.000***
3,933	27	22	33	-12	p = 0.000***
4,683	24	22	30	-7	p = 0.000***

Financials	644	2.2%	1.9%	2.5%	-0.6%	p = 0.000***	12,808	28	25	33	-8	p = 0.000***
Health care	328	2.6%	2.6%	2.5%	0.0%	p = 0.953	3,262	28	25	36	-11	p = 0.000***
Industrials	774	2.6%	2.4%	2.6%	-0.2%	p = 0.000***	6,800	27	22	32	-10	p = 0.000***
Information technology	543	2.2%	2.0%	2.3%	-0.3%	p = 0.000***	3,219	27	23	31	-7	p = 0.000***
Materials	452	3.1%	2.6%	3.2%	-0.7%	p = 0.000***	3,783	28	27	31	-4	p = 0.000***
Real estate	261	2.6%	2.4%	2.9%	-0.5%	p = 0.000***	3,118	29	22	35	-13	p = 0.000***
Utilities	189	3.1%	2.9%	3.1%	-0.2%	p = 0.000***	4,785	28	27	34	-7	p = 0.000***

*Data period from August 2015 through May 2024. We show the differences among issuers (equal-weighted) in the top and bottom quintiles during the study period (106 monthly observations). The (historical) beta was derived using MSCI Multi-Asset Class (MAC) Factor Model in MSCI's BarraOne® risk- and portfolio-management analytics platform. Credit spreads are adjusted for duration (OAS/modified duration). *** indicates 99%, ** 95% and * 90% confidence level of rejecting the H_0 that there is no difference between the two samples using the Mann-Whitney U test. Source: MSCI ESG Research*

Currencies and credit-quality grades (bond market only)

Credit spreads (duration-adj. OAS in bps)							
Grade	**Currency**	**Number of bonds**	**OAS**	**OAS (Top quintile)**	**OAS (Bottom quintile)**	**Difference (Top - Bottom)**	**p-value (significance)**
IG	**CAD**	1,306	26	34	25	-7	p = 0.000***
	EUR	7,879	23	27	23	-4	p = 0.000***
	GBP	1,398	23	24	21	-1	p = 0.000***
	USD	15,617	20	25	22	-5	p = 0.000***
HY	**EUR**	1,094	49	56	55	-7	p = 0.000***
	USD	5,244	49	53	53	-4	p = 0.000***

*Data period from August 2015 through May 2024. We show the differences among issuers in the top and bottom quintiles during the study period (106 monthly observations). China includes issuers listed in Hong Kong SAR. The (historical) stock beta was derived using the MSCI Multi-Asset Class (MAC) Factor Model in MSCI's BarraOne® risk- and portfolio-management analytics platform. Credit spreads are adjusted for duration (OAS/modified duration). *** indicates 99%, ** 95% and * 90% confidence level of rejecting the H_0 that there is no difference between the two samples using the Mann-Whitney U test. Source: MSCI ESG Research.*

Appendix 6: MSCI ESG Ratings Key Issues

MSCI ESG Ratings Key Issue Framework. MSCI ESG Research assesses thousands of datapoints across 33 ESG key issues that focus on the intersection between a company's core business and the industry-specific issues that may create significant risks and opportunities for the company. Key issues are weighted according to impact and time horizon of the risk or opportunity. All companies are assessed for corporate governance and corporate behavior. Source: MSCI ESG Research

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