FOUNDATIONS OF ESG INVESTING

Part 2: Integrating ESG into Benchmarks

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May 2018

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EXECUTIVE SUMMARY

Why do a growing number of institutional investors seek to integrate environmental, social and governance (ESG) criteria into their portfolios? We have observed four key motivations:

1. Addressing *values-based* investment constraints, such as divesting from armaments or tobacco-related securities.
2. Mitigating long-term *systemic risks* such as carbon risks. Universal owners in particular may be concerned about potential spillover effects from their direct investments that may generate costs for unrelated third parties; these costs ultimately may be borne by the entire economy and affect future returns.
3. Reducing *systematic risks* caused by changes in the market environment and the economy.
4. Identifying *stock-specific opportunities and risks* in their portfolios.

Whatever their motivations, investors may use varying methodologies to integrate ESG criteria in specific portfolios. This bottom-up ad hoc approach can lead to sub-optimal results at the total portfolio level. A top-down approach can afford greater consistency throughout the entire portfolio. The latter can help achieve systemic, systematic, stock-specific and values-based objectives. An ESG-oriented policy benchmark can also be used in setting the strategic asset allocation, measuring performance and defining the eligible universe of investable securities for both the total portfolio and individual allocations.

In Part 2 of this paper, we examine four key criteria for an index that serves as a benchmark, whether at the total portfolio level or for individual allocations. We test whether ESG indexes can be used for these purposes, using the MSCI ESG Leaders Index — a "best-in-class" approach that selects index constituents with strong ESG ratings — and the MSCI ESG Universal Index — a re-weighting methodology that relies on ESG ratings and changes in ESG ratings.

While not indicative of future performance, these ESG indexes enhanced risk reduction and led to better risk-adjusted returns during our study period. We found that the MSCI ESG Leaders Index reached a higher level of ESG integration than the MSCI ESG Universal Index. While the best-in-class methodology had stronger ESG characteristics than the tilted approach, the former had a narrower investment universe. Investors need to consider which approach may best suit their needs.

INTRODUCTION

In general, institutional investors pursuing sustainable investing policies may seek to achieve positive effects for society and to enhance their risk-adjusted returns. Sustainable investing covers a variety of approaches,[1] which (at a high level) include norms-based exclusionary screening, impact investing/sustainability themed investing, ESG integration by positive screening/ESG tilting, and voting and engagement. Norms-based screening and impact investing are focused on achieving positive effects for society, whereas the objectives of ESG integration and active ownership are typically financial, i.e., to mitigate ESG risks in the investment portfolio.

But investors do not have to choose between social considerations and financial objectives in approaching ESG investing: They may be motivated by both. In practice, the integration of ESG to address long-term risks is often intertwined with values-based considerations, e.g., in the exclusion of business activities that are seen as controversial (such as those related to tobacco and weapons).

Some very large asset owners — known as "universal owners" — have integrated social and financial concerns by adopting ESG benchmarks. They effectively own a slice of the entire market, and thus likely stand to benefit or lose when the entire economy or market gains or declines. Thus, they may be more attentive to situations where portfolio companies generate uncompensated costs for unrelated third parties (referred to as "externalities"); these universal owners may end up bearing these costs via their potential impact on future returns. Briand et al. (2011) assert that most universal owners have a fiduciary duty to ensure the multi-generational sustainability of their investment portfolios.

In fact, a broader debate exists about whether ESG criteria are consistent with asset owners' fiduciary duties. Various regulators, including in the U.S., the U.K. and the European Union, have clarified that ESG considerations can be integrated into portfolios under proscribed conditions (OECD, 2017). U.S. regulators recently clarified that ESG considerations must be "economically relevant ."[2]

[1] http://www.ussif.org/files/Publications/GSIA_Review2016.pdf

[2] In its Field Assistance Bulletin No. 2018-01 (April 23, 2018), the U.S. Department of Labor, the U.S. Department of Labor clarified that ESG factors must be economically relevant to be considered, but cautioned against assuming that all ESG investments qualify. Field Assistance Bulletin 2018-01 states: "A fiduciary's evaluation of the economics of an investment should be focused on financial factors that have a material effect on the return and risk of an investment based on appropriate investment horizons consistent with the plan's articulated funding and investment objectives. For further information, see https://www.dol.gov/agencies/ebsa/employers-and-advisers/guidance/field-assistance-bulletins/2018-01

Some large asset owners already have adopted ESG benchmarks. For example, Swiss Re changed its global equity and fixed-income policy benchmarks for its actively managed listed equities and corporate bond mandates to focus on long-term sustainable returns in 2017. As Swiss Re stated:[3]

> *"The improvement in risk-adjusted returns makes the business case viable and increases the attractiveness of ESG integration for long-term investors….*
>
> *"Adopting appropriate benchmarks and developing a monitoring and reporting framework will have the strongest impact on any institutional investor's portfolio….*
>
> *"Over the long term, we expect that such movements will motivate these [excluded] companies to further include ESG aspects into their business approach and extend their ESG-related disclosure. Due to the improved resilience to long-term risks, this is beneficial for investors as well as for the company itself. Consequently, ESG factors will have an impact on company valuation and cost of capital, and as such become an integral part of financial analysis."*

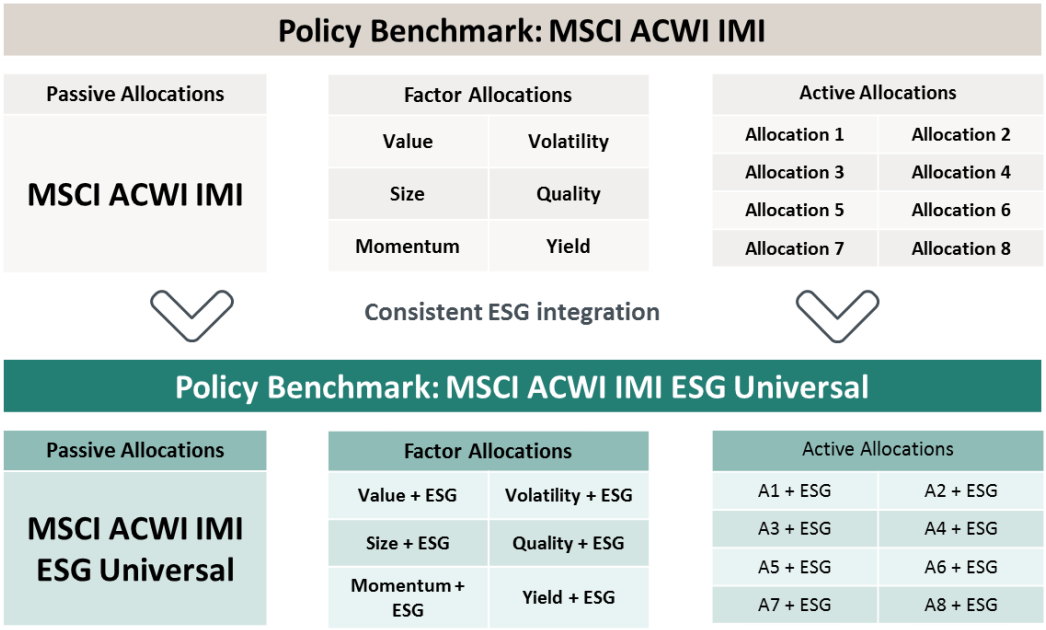
Adoption of a policy benchmark can help asset owners apply a consistent approach to integrating ESG at both the strategic asset allocation level as well as across all individual allocations. An ESG index can be used as the basis for passive allocations. In addition, asset managers, such as issuers of exchange-traded funds (ETFs), can seek to replicate an ESG index in a passive product.

In general, the path to a consistent integration of ESG, as shown in Exhibit 1, can either follow a bottom-up approach (which integrates ESG allocation-by-allocation) or a top-down approach (which starts with an ESG policy benchmark and then derives ESG integration methodologies for all types of allocations).

In the top-down approach, consistent integration is the logical starting point, while in the bottom-up approach, it is the final objective.

[3] http://media.swissre.com/documents/ZRH-17-11623-P1_Responsible+Investments_WEB.PDF

Exhibit 1: Areas of ESG Integration in Portfolio Management



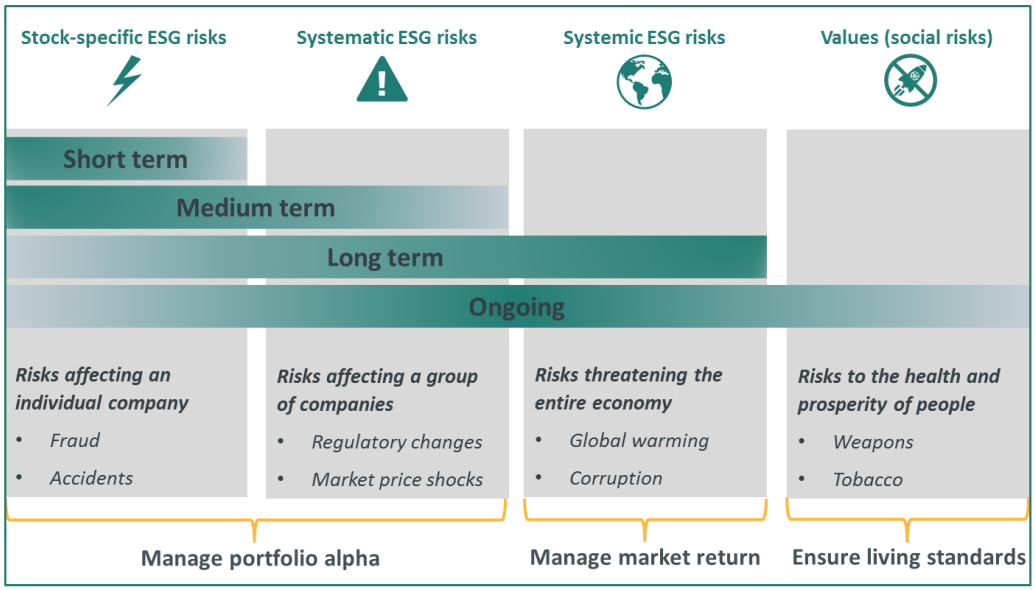
INTEGRATING ESG INTO BENCHMARKS

In Part 1 of this paper, we illustrated how ESG affected the valuation and performance of certain companies. We identified three fundamental channels that transmitted ESG characteristics into company valuation and performance: In our study sample, companies with high MSCI ESG Ratings in general experienced high levels of profitability and dividend yields and higher valuations, all drivers of long-term returns.[4] In addition, these companies generally had lower exposure to extreme events, both on a stock-specific and systematic level, providing risk mitigation. Indexes that either selected constituents with higher MSCI ESG Ratings or tilted toward these companies (the MSCI ESG Leaders and ESG Universal Indexes, respectively), experienced better risk-adjusted returns than their parent index in our study period.

Part 1 of this paper focused on ESG risks that are financially significant in the short to medium term and that can be quantified using standard factor model techniques. However, benchmarks are used over various time periods. Thus, this part of this paper examines how policy benchmarks can be used to reflect an asset owner's values and to address a broader range of financially significant ESG risks over short, medium and long time periods. Overall, there are four types of ESG risks that asset owners may seek to address: values-related ESG risks, systemic ESG risks, systematic ESG risks and stock-specific ESG risks (Exhibit 2).

[4] We used the MSCI World Index universe from end of 2007 to end of 2017 as the sample universe in Part 1.

Exhibit 2: Time Horizons for Types of ESG Risks



These types of risks can have a significant impact on financial performance, though on different time horizons: Values-related ESG risks are ongoing, although their impact may evolve as investor actions can influence corporate behavior. Systemic risks, such as the risk to the environment posed by carbon, may develop unnoticed in the short term but can be very significant in the long run. Systematic risk is related to changes or shocks in the market environment and can affect financial performance in the short to medium term. Stock-specific risks can surface in the very short term and may have a significant impact on a specific company.

VALUES-RELATED RISKS

Some asset owners may abide by certain non-financial societal objectives. These can relate to risks posed to the general public's health, as affected by their consumption of tobacco or alcohol, or the use of weapons. Some faith-based asset owners may also wish to address business activities that are not aligned with their beliefs. Values-related risks are not linked to a particular time horizon.

SYSTEMIC RISKS

As the largest asset owners, universal asset owners may want to address systemic risks in their portfolios (Hawley et al., 2018). In particular, they may be concerned that actions by some companies can create negative externalities that generate costs for other market

participants. These negative externalities may be social or financial in nature. Social externalities are typically addressed by values-based exclusions. Here, however, we focus on financially relevant externalities. For example, greenhouse gas emissions by some companies may in the long run produce costs for other companies and society as a whole.[5]

While managing systematic or stock-specific risks takes place at the portfolio level, addressing systemic risks implies the opportunity to enhance the long-term market return. Institutional investors can approach systemic risks both through portfolio construction and through their engagement with companies. These approaches aim to improve overall capital allocation and create better macroeconomic outcomes in the long run.

SYSTEMATIC AND STOCK-SPECIFIC RISKS

Asset owners and asset managers may also seek to reduce exposure to systematic and stock-specific risks. Through such risk mitigation, portfolios could be less vulnerable to changes in regulation, changes in commodity prices or exogenous market shocks that may affect certain industries or sectors but not the entire global economy.

Investors also may seek to reduce exposure to individual stocks with low ESG ratings (the idiosyncratic risk channel explained in Part 1 of this paper) and increase their exposure to highly rated ESG companies (the cash-flow channel), as well as lowering systematic risk (the valuation channel). Examples of stock-specific risks include operational incidents or cases of fraud or embezzlement within a company.

Historically, companies included in the MSCI ACWI Index[6] that had higher MSCI ESG Ratings have weathered such problems better than those with low ratings. Highly rated companies have been less susceptible to market shocks and have offered more resilient long-term returns.[7]

ADOPTING A CONSISTENT APPROACH

Institutional investors often have not applied a consistent approach to ESG integration across their portfolios in the past. They have used varying methodologies and have not

[5] Systemic ESG risks were beyond the scope of Part 1, because the long time horizon of systemic risks makes them hard to assess through traditional factor analysis methodologies.

[6] MSCI ACWI Index covers large- and mid-cap stocks across 23 developed and 24 emerging markets. MSCI ACI IMI covers large-, mid- and small-cap stocks across those same markets.

[7] We show that the MSCI ACWI ESG Leaders Index experienced lower drawdowns than the parent MSCI ACWI Index later in this paper for the study period from November 2009 to December 2017.

integrated ESG in all portfolios.[8] Such inconsistent practices may lead to sub-optimal results.[9]

To ensure the consistent integration of ESG across all areas of asset management, a more holistic approach may be needed. Exhibit 3 illustrates how asset owners may use the investment policy, policy benchmark and benchmarks for individual portfolios ("performance benchmarks") to address the different types of ESG risks discussed above. The **investment policy** reflects the global asset allocation defined by the board of trustees and is where the asset owner's overall ESG integration strategy would be defined, encompassing both systemic risks and additional norms with which it wants to comply, e.g., the United Nations Global Compact.[10] The **policy benchmark** defines the overall investable universe in line with the investment policy's guidelines and the strategic asset allocation, in terms of regional, sectoral or size subsets. Within the policy benchmark, each allocation is measured by a **performance benchmark**, which reflects the allocation's strategy. The latter can vary from a narrowly defined regional or factor subset to one that covers the entire equity allocation.

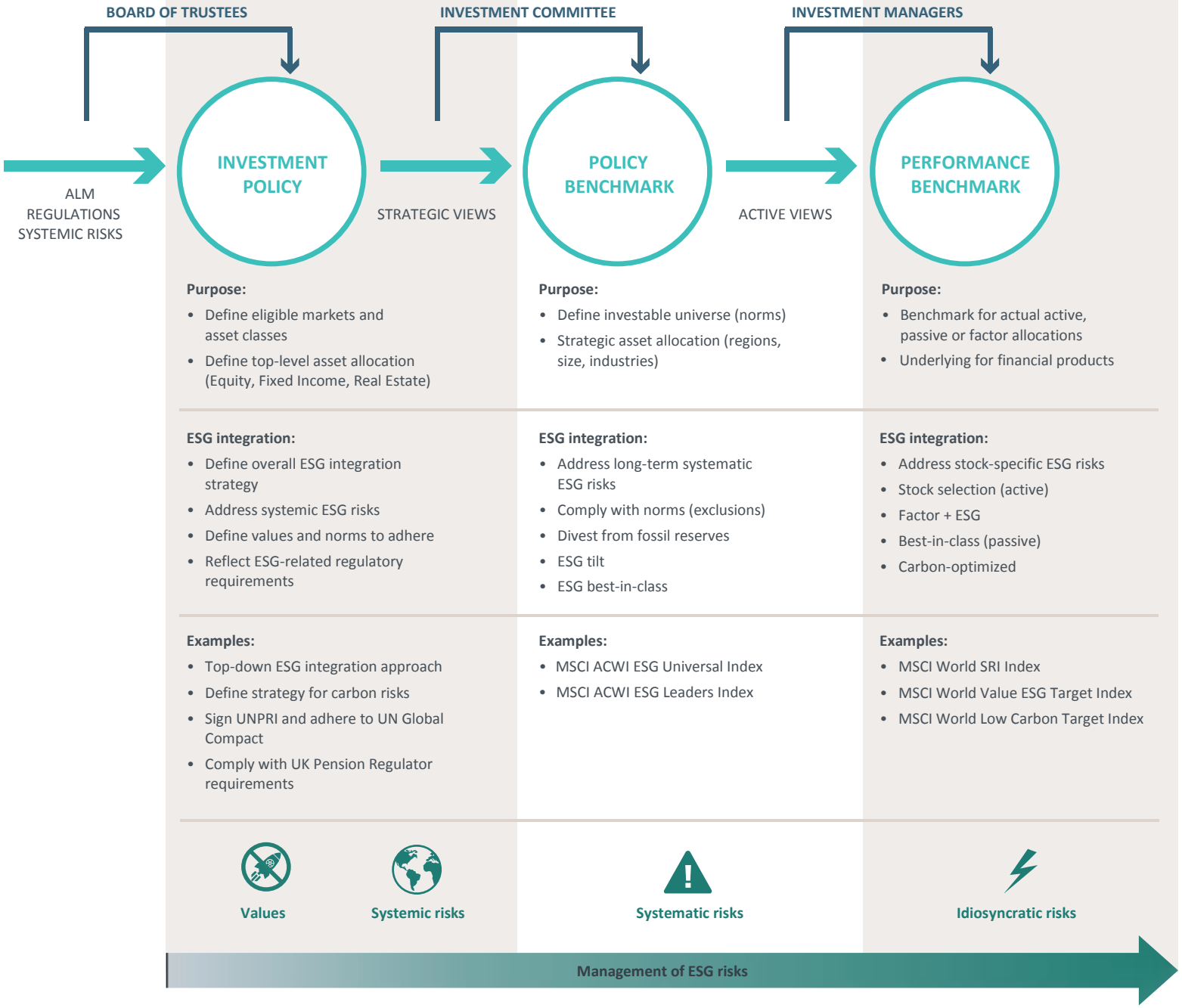
Some asset owners use an intermediate benchmark between the policy benchmark and the performance benchmark, typically called the strategy benchmark. This additional layer usually reflects the breakdown of the global policy benchmark into regional strategy subsets, which are then used to define performance benchmarks for concrete allocations. In this paper, we have aggregated this strategic layer into the policy benchmark discussion.

[8] See Eccles, R., M. Kastrapeli and S. Potter (2017).

[9] We will discuss this issue in more detail in the next part of this paper.

[10] https://www.unglobalcompact.org/

Exhibit 3: Potential Ways to Integrate ESG into the Investment Process



In our view, both policy and performance benchmarks based on indexes can generally fulfill the four key functions, as shown in Exhibit 4.

Exhibit 4: Essential Functions of a Benchmark

For instance, Kang et al. (2010) demonstrate how the MSCI ACWI Index, a typical global equity benchmark, meets these four criteria. Are ESG indexes viable substitutes for (or additions to) traditional market-cap benchmarks? What advantages and trade-offs can asset owners expect when switching to (or adding an) ESG benchmark?

ESG INDEXES

Before addressing these questions, we examine the ESG, financial, risk and return characteristics of two ESG indexes. Then we examine what trade-offs investors may expect when using ESG indexes as benchmarks. We also highlight what criteria to use when assessing this question.

We use the MSCI ESG Leaders Index, which uses a best-in-class selection methodology that is designed to target the top 50% of companies in terms of free-float market capitalization per sector and region, and the MSCI ESG Universal Index, which is designed to tilt toward

constituents with higher ESG ratings combined with an ESG momentum score.[11] More details on each index methodology can be found in the Appendix.

ESG PROFILE

Not surprisingly, a key requirement for an ESG index is to display stronger ESG characteristics. Both ESG indexes achieved a higher average ESG score and higher average values for the individual E, S and G pillar scores compared to the MSCI ACWI Index (Exhibit 5) as of Dec. 31, 2017.[12] Both indexes overweighted ESG leaders and underweighted ESG laggards. The improvements were stronger for the MSCI ESG Leaders Index; this result was not surprising given that selecting the top half of constituents based on high MSCI ESG Ratings created a stronger shift toward ESG than tilting a broader universe toward high ESG ratings. In general, the improvement in the overall ESG profile addressed both systematic and idiosyncratic ESG risks.

Both index series also experienced a reduction in carbon exposures. This may be particularly important for investors who want to address long-term systemic risks related to carbon.

Finally, both indexes had reduced exposure to tobacco and weapons manufacturers as well as companies in violation of the UN Global Compact, showing the influence of values-based considerations.

[11] MSCI industry-adjusted ESG scores are mapped onto a rating grid from CCC to AAA as shown in Exhibit A2 in the Appendix. The ESG momentum score is calculated as the yearly change of the industry-adjusted ESG score.

[12] Results may vary at different times. Past or backtested performance is not indicative of future results.

Exhibit 5: Key ESG Characteristics of Select MSCI ESG Indexes vs. MSCI ACWI Index

	MSCI ACWI Index	MSCI ACWI ESG Universal Index	MSCI ACWI ESG Leaders Index
Integration			
Key Integration Metrics			
ESG Score	5.5	6.4	6.6
ESG Leaders (AAA-AA) (%)	22.3	38.6	38.4
ESG Laggards (B-CCC) (%)	14.3	5.9	3.1
ESG Trend Positive (%)	18.1	20.1	12.5
ESG Trend Negative (%)	8.0	4.6	6.7
ESG Pillars			
Environmental Score	5.5	5.9	6.0
Social Score	4.5	4.9	5.1
Governance Score	4.7	5.0	5.1
Key Governance Metrics			
Lack of Independent Board Majority (%)	14.6	13.6	14.0
Deviation from One Share One Vote (%)	25.2	24.9	23.4
No Female Directors (%)	9.6	8.1	8.7
Values			
Tobacco Producers (%)	1.3	0.9	0.0
Ties to Controversial Weapons (%)	0.7	0.0	0.0
Global Compact Compliance Violation or Watch List (%)	13.1	9.4	4.8
Red Flag Controversies (%)	3.3	0.0	0.0
Orange Flag Controversies (%)	25.8	24.5	17.9
Carbon Exposure			
Carbon Emissions (t CO2e/$M Invested)	132	118	101
Carbon Intensity (t CO2e/$M Sales)	239	221	192
Wtd Avg Carbon Intensity (t CO2e/$M Sales)	211	194	200
Potential Carbon Emissions (t CO2e/$M Invested)	2948	1968	1775
Coal Reserves (%)	0.9	0.6	0.3
Fossil Fuel Reserves (%)	6.2	4.2	4.2

Data as of Dec. 31, 2017

FINANCIAL PROFILE

As discussed in Part 1 of this paper, higher ESG-ranked companies influenced financial measures such as valuation levels and key risk indicators from January 2007 to May 2017, based on the MSCI World Index. Now, we assess how these transmission channels worked in

practice. Exhibit 6 shows that both ESG indexes demonstrated higher valuations as measured by price-to-book, price-to-cash earnings and price-to-earnings ratios, as of Dec. 31, 2017. Both indexes also demonstrated higher returns on equity while the ESG Universal Index showed a slightly higher dividend yield.

Thus, the theoretical valuation effects that we discussed in Part 1 were fully reflected in both ESG indexes. The valuation effect was stronger for the MSCI ESG Leaders Index, which is in line with intuition: The best-in-class driven selection of the MSCI ESG Leaders Index uses a stronger integration methodology than the tilted weights approach of the MSCI ESG Universal Index.

Exhibit 6: Key Financial Indicators of ESG Indexes vs. MSCI ACWI Index

	MSCI ACWI Index	MSCI ACWI ESG Universal Index	MSCI ACWI ESG Leaders Index
Price to Book	1.9	2.0	2.1
Price to Cash Earnings	9.7	9.8	10.3
Price to Earnings	16.9	16.9	17.5
Price to Sales	1.2	1.2	1.3
Div Yield (%)	2.6	2.6	2.6
LT Fwd EPS G (%)	11.2	10.8	11.0
Sustainable Growth Rate (%)	6.5	6.5	6.5
ROE (%)	11.4	11.8	12.0
Leverage	1.5	1.4	1.4

Data as of Dec. 31, 2017

RISK AND RETURN PROFILE

A key motivation for adopting ESG indexes is to take advantage of the ESG risk indicators in MSCI ESG Ratings. Exhibit 7 compares key risk indicators for both ESG indexes to the underlying MSCI ACWI Index.

Exhibit 7: Key Risk Indicators of Select ESG Indexes vs. MSCI ACWI Index

	MSCI ACWI Index	MSCI ACWI ESG Universal Index	MSCI ACWI ESG Leaders Index
Absolute Risk Metrics			
Total Risk* (%)	13.1	12.9	12.7
Annualized Downside Deviation* (%)	8.1	7.9	7.8
Sortino Ratio*	1.23	1.27	1.32
VaR @ 95%	-6.5	-6.4	-6.3
VaR @ 99%	-9.4	-9.1	-9.1
Expected Shortfall (CVaR) @ 95%	-8.4	-8.0	-8.0
Expected Shortfall (CVaR) @ 99%	-9.4	-9.5	-9.4
Max Drawdown (%)	22.9	21.9	21.3
Max Drawdown Period (in months)	5	5	5
Skewness	-0.26	-0.23	-0.24
Kurtosis	3.82	3.59	3.82

Data from Nov. 30, 2009 to Dec. 31, 2017. Period reflects the longest time period data was available for all three indexes.

There was a clear reduction in all relevant risk measures for both ESG index methodologies: Total risk (i.e., volatility), Value at Risk (VaR), expected shortfalls, maximum drawdowns and tail-risk measures such as skewness and kurtosis all declined. On average, risk reduction metrics were slightly stronger for the MSCI ESG Leaders Index. Exhibit 7 suggests that the financial effects we found in MSCI ESG Ratings in the first part of this paper – a reduction of systematic risk (volatility) and lower tail risks (draw-downs and kurtosis) – fed directly into the corresponding risk characteristics of both ESG indexes.

In addition, while not indicative of future results, both ESG indexes experienced better performance than the parent index during our study period (Exhibit 8). In combination with reduced risk levels, this resulted in better risk-adjusted returns, as reflected in improved Sharpe ratios and positive information ratios.

Exhibit 8: Key Performance Indicators of Select ESG Indexes

	MSCI ACWI Index	MSCI ACWI ESG Universal Index	MSCI ACWI ESG Leaders Index
Total Return* (%)	10.0	10.1	10.2
Total Risk (%)	13.1	12.9	12.7
Return/Risk	0.76	0.78	0.81
Sharpe Ratio	0.74	0.75	0.78
Active Return (%)	0.0	0.1	0.3
Tracking Error (%)	0.0	1.0	1.0
Information Ratio	NaN	0.10	0.27

Data from Nov. 30, 2009 to Dec. 31, 2017

Thus, both the MSCI ESG Universal and MSC ESG Leaders indexes offered modest performance improvements and risk protection compared to a standard market-cap benchmark. Tracking error of both indexes to their market-cap parent index was relatively moderate (around 1%).

INDEX PROFILES

Finally, we examined how well these two ESG indexes represented the performance characteristics and the composition of the underlying equity market.

The MSCI ESG Universal Index had 96% of the market-cap coverage of the parent index due to the limited number of exclusions in the index methodology (Exhibit 9), while the MSCI ESG Leaders Index (by definition) had only 50% of the parent index's coverage, due to its best-in-class selection methodology. Nevertheless, both ESG indexes represented the underlying large and mid-cap markets proportional to the parent index.

Exhibit 9: MSCI ESG Index Profiles

	MSCI ACWI Index	MSCI ACWI ESG Universal Index	MSCI ACWI ESG Leaders Index
Concentration Metrics			
Avg No of Stocks	2481	2399	1210
Effective No of Stocks	433	365	287
Market Cap Coverage (%)	100.0	96.1	50.0
Top 10 Sec Wt (%)	9.0	10.6	11.6
Size Family Exposures			
Large (%)	82.5	82.6	82.3
Mid (%)	17.5	17.4	17.7
Small (%)	0.0	0.0	0.0
Micro (%)	0.0	0.0	0.0
Liquidity Metrics			
Weighted Average ATVR (%)	114.9	109.7	110.9
Turnover (%)	2.1	11.9	6.8

Data as of Dec. 31, 2017. Liquidity metrics from Dec. 31, 2014 to Dec. 31, 2017. The liquidity calculation is based on last three years to reflect recent index history. Before 2014, index turnover may have been inflated as emerging markets coverage was expanded over time.

However, concentration risk measures, such as the aggregate weight of the top 10% holdings and the effective number of stocks[13] in the index, showed a modest increase in both ESG indexes.

Moreover, while the liquidity profile of both ESG indexes as measured by the Annualized Traded Value Ratio (ATVR) was close to the parent index, the yearly turnover for the MSCI ESG Universal Index was more than five times higher than the parent index, while the MSCI ESG Leaders Index's turnover was about three times higher than the MSCI ACWI Index. Turnover in the ESG indexes was driven by two sources: the turnover of the underlying parent index and the turnover of the underlying ESG ratings. For the MSCI ESG Universal Index, using ESG momentum in the combined scores also contributed to increased turnover.

In short, preferring high ESG-rated companies in the index construction incurred an increase in concentration risk and index turnover.

Did this heightened turnover impair ESG integration? As we discussed in Part 1 of this paper, the ESG signal experienced lower intensity but longer lifespan than most common factors.

[13] The effective number of stocks is defined as the inverse of the Herfindahl-index, which is a standard measure for portfolio concentration.

Did these ESG indexes reflect this longer time horizon? This issue was more significant for the MSCI ESG Leaders Index, which selected the better half of ESG ratings, than the MSCI ESG Universal Index, which kept almost all of the constituents of the parent index.

Looking at developed markets, where we have a longer complete history, Exhibit 10 compares the average lifespan of constituents within the MSCI World Index[14] to the lifespan of constituents within the MSCI World ESG Leaders Index. Although the lifespan of constituents in the MSCI World ESG Leaders Index was lower than in its parent index due to the higher index turnover, the average survival time of companies within the MSCI ESG Leaders Index was still around eight years.[15]

Exhibit 10: Survival of Constituents (%) in MSCI World and World ESG Leaders Indexes

Data from Aug. 31, 2010 to Dec. 31, 2017 (live index history)

ESG INDEXES AS POLICY OR PERFORMANCE BENCHMARKS

How well-suited are ESG indexes as **policy or performance benchmarks**? What trade-offs exist when choosing an ESG benchmark? We examine this question using the four criteria

[14] MSCI ESG Ratings covered developed markets during the entire study period. Full coverage of emerging markets did not occur until June 2013.

[15] In Part 1 of this paper, we showed that ESG ratings of companies have been relatively stable. Thus, survival times of constituents In the MSCI ESG Leaders index have tended to be long.

that we discussed earlier (Exhibit 4), using the MSCI ESG Leaders and ESG Universal indexes as examples.

DEFINE THE INVESTABLE UNIVERSE

The global policy benchmark must describe the opportunity set. Any investment limitations imposed on the total fund (typically described in the investment policy) should be reflected in the policy benchmark. For instance, asset owners whose investment policy includes a quantitative reduction target for greenhouse gas emissions or does not allow any exposure to tobacco companies or weapon manufacturers may seek to reflect this constraint in their policy benchmark. Some ESG-related constraints may be required by an asset owner's regulator or proposed by international norms (such as the exclusion of tobacco companies recommended by the United Nations Global Compact since 2017).

Incorporating such constraints also ensures that the policy benchmark is aligned with the asset owner's overall portfolio and its investment managers. Such constraints may affect returns and risks, as the opportunity set shrinks.[16]

The MSCI ACWI ESG Universal Index showed nearly the same number of constituents and level of diversification as the parent MSCI ACWI Index. However, by definition, the MSCI ESG Leaders Index shrank the universe to roughly half the securities in the parent index (while demonstrating similar diversification across regions and industries).

What was the potential cost to performance for active managers from eliminating half the opportunity set? To analyze the impact on the ability of active managers to generate alpha,

[16] Several industry studies have analyzed the potential risk return trade-off from values-based exclusions in practical terms. Schroders (2017) have analyzed the impact of excluding companies with exposure to tobacco gambling, weapons manufacturing, alcohol, nuclear power and adult entertainment within the MSCI World Index from 2007 to 2017. They found that exclusions can lead to a significant tracking error, while the simulated performance impact within the MSCI World universe was negligible. They also observed that exclusions led to significant industry and style factor exposures. This was confirmed in the study by Hermes (2016), which observed that the active industry exposure can lead to varying performance contributions, depending on the industry: In their study period from 2011 to 2016 the exclusion of gambling and nuclear power had a positive performance impact, whereas the exclusion of tobacco and weapons had a negative impact within the MSCI World universe. Overall, these results suggest that values-based exclusions led primarily to tracking error and performance effects that are linked to the business cycle of specific industries.

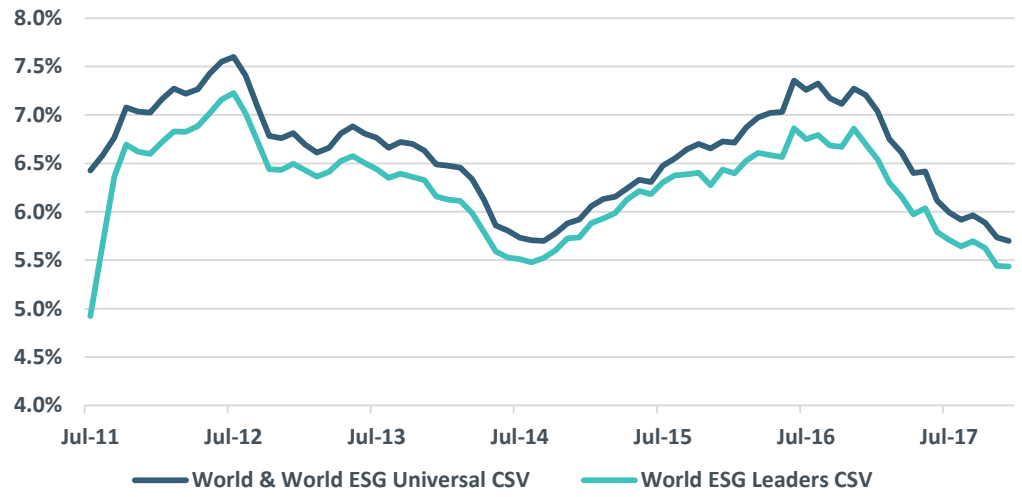
In addition, Nagy et al. (2017) analyzed the effects of excluding stocks based on the severity of controversies in which they had been implicated. They found that the exclusion of stocks involved in the most severe events (i.e., so-called red flags) had a moderately positive effect on portfolio returns over the sample period. Increasing the number of stocks excluded – expanding to include implications in less severe controversies – quickly increased tracking error and led to a number of unintended systematic bets and deteriorated realized active returns.

The application of exclusions alongside the integration of ESG criteria exemplifies how ESG integration is intertwined with values-based considerations in many practical applications.

we use the concept of "cross-sectional volatility" of returns (CSV): The more variation seen in daily stock returns across the universe, the greater the opportunities that existed for active managers to generate alpha.

Exhibit 11 compares the total cross-sectional volatility of monthly returns of the MSCI World[17] and MSCI ESG Universal indexes[18] to the corresponding MSCI World ESG Leaders Index.

Exhibit 11: CSV of MSCI World, MSCI World ESG Universal and MSCI World ESG Leaders Indexes



Data from July 29, 2011 to Dec. 31, 2017

The average cross-sectional volatility of the MSCI World ESG Leaders Index was 6.3%, slightly below the 6.6% CSV of its parent index during the period shown in Exhibit 11. Despite halving the universe of eligible securities, the alpha potential for active managers was (on average) only slightly lower within the ESG Leaders universe than for the MSCI World Index.

[17] In this analysis, we use the MSCI World Index instead of the MSCI ACWI Index because of the longer live history available for the MSCI World ESG Leaders Index., warranting the use of the MSCI World Index for a portion of this study rather than the MSCI ACWI Index.

[18] The values for the MSCI ESG Universal Index methodology were nearly identical to the MSCI World Index (i.e., it had the same opportunity set). Therefore, we focus the analysis on the ESG Leaders methodology.

For the ESG Universal Index, the alpha potential was the same as for its parent index, because it kept almost all constituents of the parent index in its eligible universe.

However, the CSV analysis provides only an overview of the *average* opportunity set within the universe, as specific stocks may be excluded. For instance, during its live period, the MSCI ESG Leaders Index did not include stocks such as Apple Inc. Keeping Apple off-benchmark may be too restrictive for many active U.S. equity managers. A broader index such as the ESG Universal Index may be a more desirable benchmark in this type of situations.

In brief, a good CSV profile tells only part of the story. In some situations, it may be important for the benchmark to include practically all securities in a given market.

SERVE AS BASIS FOR RESEARCH AND STRATEGIC ASSET ALLOCATION

Traditional benchmarks allow for a logical breakdown into regions, industries and size segments, which can be used by asset owners in guiding their investment research and in setting their strategic asset allocation. This way, benchmarks also define developed markets, emerging markets and frontier markets, as well as size groups, industries and styles.

Both ESG index series used here cover the global large- and mid-cap segments and can be broken down into sub-regions, the key building blocks used in setting the strategic asset allocation. But how well does each preserve the regional, sectoral or size weights of the parent index?

Exhibit 12 summarizes the average active sector weights for both ESG index methodologies. During the observation period, the average active sector weight[19] was 1.08% for the MSCI ESG Universal Index and 0.98% for MSCI ESG Leaders Index — both were fairly close to parent index. The MSCI ESG Leaders Index experienced a slightly lower active sector weight because the index is designed to control for sectors (by performing a best-in-class selection at a sector level per region), while the MSCI ESG Universal Index is not.

[19] Measured as the cross-sectoral standard deviation of average sectoral active weights.

Exhibit 12: Active Sector Weights of MSCI ESG Universal and ESG Leaders Indexes

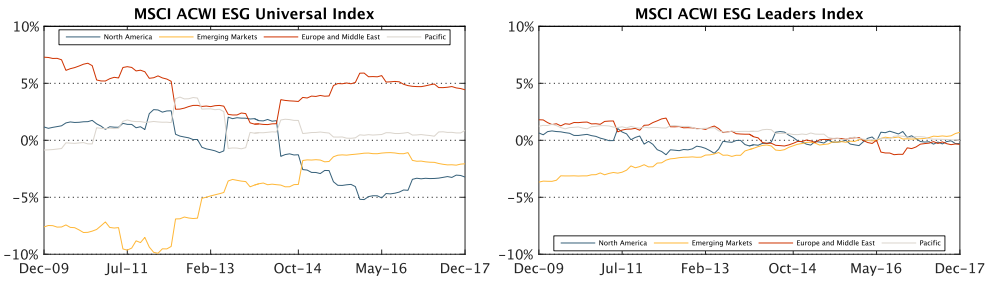
MSCI ACWI ESG Universal Index (%)	Min	Max	Average	Current
Energy	-4.8	-0.8	-2.1	-1.9
Materials	-2.0	0.4	-0.5	-0.4
Industrials	-0.4	3.0	1.3	0.8
Consumer Discretionary	-1.3	0.4	-0.5	-0.7
Consumer Staples	-1.6	1.6	-0.1	0.3
Health Care	-1.1	2.1	0.1	-1.1
Financials	-3.6	0.9	-0.9	0.9
Information Technology	0.4	3.9	2.0	1.6
Telecommunication Services	0.0	1.5	0.5	0.0
Utilities	-0.3	0.6	0.2	0.5
Real Estate	-0.2	0.0	0.0	-0.1
Stdev			**1.08**	

MSCI ACWI ESG Leaders Index (%)	Min	Max	Average	Current
Energy	-4.3	-0.4	-2.6	-0.4
Materials	-0.8	0.5	-0.2	0.0
Industrials	-0.3	1.1	0.3	0.3
Consumer Discretionary	-0.4	0.5	0.2	0.1
Consumer Staples	-1.0	0.4	-0.3	-0.3
Health Care	0.3	1.5	1.0	0.3
Financials	-0.5	2.8	1.2	0.0
Information Technology	-0.8	1.6	0.3	-0.5
Telecommunication Services	-0.5	0.7	0.1	0.4
Utilities	-0.4	0.2	0.0	0.1
Real Estate	-0.1	1.1	0.1	0.0
Stdev			**0.98**	

Data from Nov. 30, 2009 to Dec. 31, 2017

At the regional level, the MSCI ACWI ESG Leaders Index showed fairly low deviations from the parent index's weights due to its regional best-in-class selection (Exhibit 13). In comparison, the MSCI ACWI ESG Universal Index displayed a significant average underweight in emerging markets and an overweight in Europe. The greater differences from the parent index reflect that European companies tended to show higher ESG scores than emerging markets companies. Also, the ESG Universal Index is not designed to control for regional biases.

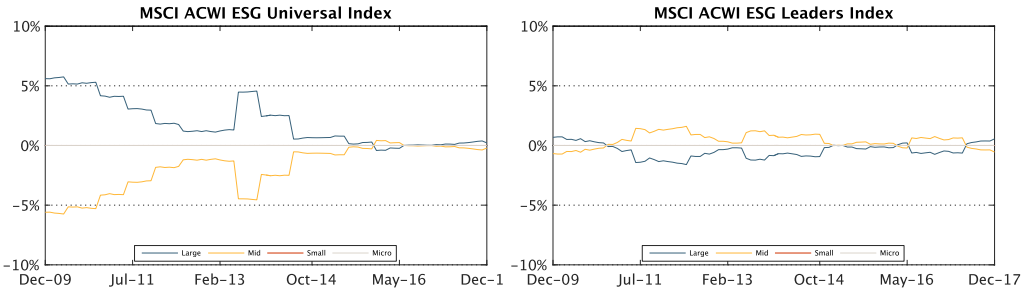
Exhibit 13: Active Regional Weights of MSCI ESG Universal and ESG Leaders Indexes[20]



Data from Nov. 30, 2009 to Dec. 31, 2017

Finally, Exhibit 14 compares the active size exposures of both index families. Active size weights were fairly small for both, with the MSCI ESG Leaders Index showing slightly smaller active weights than the ESG Universal Index.

Exhibit 14: Active Size Weights of MSCI ESG Universal and ESG Leaders Indexes



Data from Nov. 30, 2009 to Dec. 31, 2017

SERVE AS THE BASIS FOR ALLOCATIONS AND FINANCIAL PRODUCTS

In the criteria described above, an index used as the performance benchmark for actively managed portfolios has to offer sufficient investment opportunities and diversification.

[20] The MSCI Emerging Markets ESG Leaders Index and the parent MSCI ACWI ESG Leaders index were launched in June 2013. We used index histories since November 2009 across all regions. Thus, we combined a simulated history from November 2009 to May 2013 and live history from June 2013 to December 2017 for the emerging markets index. Since MSCI ESG Ratings did not fully cover all components of the MSCI Emerging Markets region before June 2013, there were more regional biases in the asset allocation before that date.

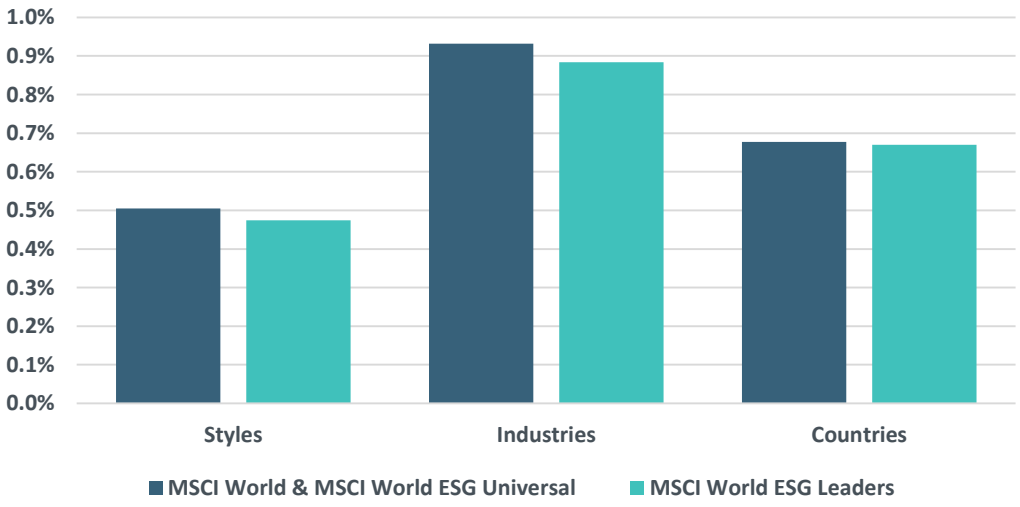
Typically, this objective requires the index to have a sufficient number of constituents, no matter how narrow a slice of the total universe it represents. Traditional index methodologies typically contain coverage and diversification rules for regions and/or industries and size segments. Factor investors would likely also require the index to provide a sufficient number of opportunities.

In addition, an index that is replicated by a passive product also needs to be rules-based, transparent and easy to replicate. A fund replicating the index also should be able to have sufficient capacity.

In our example, the MSCI ESG Universal Index contained almost all of the constituents of the parent index and therefore had almost the same opportunity set to run industry, country or factor strategies. Did the ESG Leaders Index — with its reduced universe — provide the same flexibility?

Exhibit 15 shows that the factor (styles), industry and country contributions to the universes' CSV profile was only slightly lower for the MSCI ESG Leaders Index than for its parent index, but the MSCI ESG Leaders Index still offered a comparable opportunity set.

Exhibit 15: Styles, Industries and Countries Contributions to CSV



Data from July 29, 2011 to Dec. 31, 2017

Indexes are used not only at a strategic level within asset owners' investment processes but may also be used for defining passive allocations. In addition, asset managers may seek to replicate them within passive financial products such as ETFs.

What makes an index viable as the basis for an allocation or an index-tracking product? And how can ESG indexes be used as performance benchmarks?

To reiterate, according to the criteria we set out above, an index should:

- Reflect the investment objective of the allocation (or the financial product)
- Be replicable in a cost-efficient way (liquidity/turnover of the index)
- Reflect the financial risk profile and risk appetite of the asset owner (risk-return characteristics, factor allocation, risk diversification)

The purpose of investing in a fund that replicates an ESG index is typically to gain exposure to sustainable companies. The motivation for this decision can be financial – i.e., the desire to achieve better risk-adjusted returns in the long term – and/or based on the conviction that this will create positive social effects in the long run.

In addition, it has become common practice in ESG investing to exclude exposures to highly controversial activities such as weapons manufacturing. This practice also needs to be reflected in the index construction.

The MSCI ESG Universal and MSCI ESG Leaders indexes both seek to avoid controversial business activities and to gain greater exposure to high MSCI ESG Ratings. However, they offer two different levels of ESG integration and therefore correspond to two different levels of conviction with respect to ESG investing:

- The MSCI ESG Universal Index is designed to exclude only the most controversial business activities and then tilts the component weights toward higher MSCI ESG Ratings and rating upgrades. This methodology is likely geared toward a moderate level of ESG integration.
- The MSCI ESG Leaders Index follows a stronger ESG integration approach as it aims to exclude a wider range of business activities (such as alcohol and tobacco production) and performs a best-in-class selection of high ESG ratings.

For an index to be considered as the basis for a passive portfolio, the ability to efficiently replicate is also a common requirement. The key criteria that define the replicability of an index are its liquidity profile and turnover. Both ESG index series had similar liquidity characteristics as their parent index (Exhibit 9). Their turnover was higher but was still moderate compared to turnover profiles seen in some factor indexes. For example, quality, minimum volatility and dividend yield factor indexes experienced turnover rates above 20%, while the momentum index exhibited turnover above 90% during the study period from November 1975 to March 2014 (Alighanberi et al., 2014). Overall, we did not observe any liquidity or turnover issues that would have hindered replicability of either ESG index.

MEASURE PERFORMANCE OF THE TOTAL PORTFOLIO AND INDIVIDUAL PORTFOLIOS

A benchmark needs to be a fair and transparent yardstick measuring performance of both passive and active portfolios in various market segments. To do so, the benchmark needs to be representative of the investment strategy.

Both the MSCI ESG Universal Index and the MSCI ESG Leaders Index had a modest tracking error of about 1% relative to the MSCI ACWI Index during our study period (Nov. 30, 2009 to Dec. 31, 2017), which suggests they provided a consistent yardstick to measure performance. However, both ESG indexes slightly outperformed the market-cap parent index, on both an absolute and risk-adjusted basis.

In addition, the liquidity and turnover profile of both indexes was relatively close to their parent benchmark. Looking at our four criteria, the results for both ESG indexes were relatively close to those of the parent market-cap index.

FIXED-INCOME ESG BENCHMARKS

As asset owners seek to address systematic and idiosyncratic risks and to reflect values-based considerations in their equity portfolios, they may wish to do the same for their fixed-income allocations. Universal owners also may want to address systemic risks.

In principle, one can use the same methodological building blocks for integrating ESG into fixed-income indexes as for equity indexes, i.e., either a best-in-class selection of bonds whose issuers have high ESG ratings or a tilt toward higher ESG ratings. This approach aims to ensure consistency in ESG integration across an asset owner's global portfolio.

The Bloomberg Barclays MSCI Sustainability Indices (a best-in-class approach) and the Bloomberg Barclays MSCI ESG Weighted Indices, which tilt toward high MSCI ESG Ratings, reflect these two different index methodologies. Both index series use the Bloomberg Barclays Global Aggregate Bond Index series as a starting point – analogous to how we used the MSCI ACWI Index as the basis for our equity ESG indexes. However, implementing a best-in-class selection or an ESG tilt is more challenging for aggregate bond indexes due to the various issuer categories that need to be considered.

- Corporate bonds and covered bonds: The respective corporate ESG rating of the issuer is used (same as for equity).
- Sovereign debt: The ESG rating of the issuing country is used, employing the MSCI ESG Government rating methodology.

- Asset-backed securities: MSCI ESG Ratings are not available. Both index methodologies keep the asset-backed securities of the underlying benchmark universe in the index.

Desclee et al. (2016) found that integrating MSCI ESG ratings into bond indexes – using both best-in-class and tilted methodologies – had a similar effect as in equity indexes: a visible reduction in risk, a slight improvement in returns and hence an overall improvement in risk-adjusted returns. This result was consistent with our earlier observations – the reduction of idiosyncratic risks had a positive influence on both equity and corporate bond prices. The authors also observed governance scores to have some predictive power for credit rating downgrades, strengthening the evidence for the idiosyncratic risk channel. They also found slightly higher levels of valuation. These findings suggest that the systematic and idiosyncratic risk channels we identified in Part 1 of this paper can apply to fixed-income indexes as well. Likewise, the link between ESG ratings and higher levels of profitability (cash-flow channel) may apply to equity and bond investors alike.

In addition, the authors observed a similar trade-off between ESG integration and the diversification, tracking error and turnover of the indexes as we saw for ESG equity indexes.

CONCLUSION

Asset owners may seek to integrate ESG criteria in their benchmarks to mitigate long-term systemic ESG risks, short- to medium-term systematic ESG risks and stock-specific risks for individual active and passive allocations. In addition, ESG benchmarks can help address values-based investment constraints.

Regardless of motivation, ad hoc approaches to ESG integration — using various approaches or only in select portfolios — may lead to sub-optimal results. Switching to an ESG policy benchmark may lead to a more consistent approach across the entire portfolio.

We described two possible paths to applying a consistent level of ESG integration: 1) the top-down approach, which starts with the definition of global ESG policy benchmarks and then derives ESG implementation methodologies for all allocations; 2) the bottom-up approach, which integrates ESG allocation-by-allocation and may ultimately lead to the adoption of an ESG policy benchmark.

In the interim, asset owners may choose to add an ESG policy benchmark to test the waters. The choice of an ESG benchmark may differ depending on whether it is used at a strategic level (as a policy benchmark) or at an allocation level.

Our key findings regarding construction of ESG benchmarks:

- Both the best-in-class selection index and the ESG tilt indexes showed better risk-adjusted returns than existing market-cap benchmarks in our study period, consistent with the observations in Part 1 of this paper.
- Both indexes were able to describe the strategic asset allocation, define the opportunity set for active managers, form the basis for active and passive allocations and serve as a performance benchmark.
- ESG integration implies a trade-off between the level of ESG integration and the size of the opportunity set, index diversification and turnover. A best-in-class methodology and an ESG tilt methodology represent different options.
- The choice between the MSCI ESG Universal and MSCI ESG Leaders indexes as a new policy benchmark is ultimately a question of how asset owners balance the benefits of ESG integration versus the reduction of diversification and opportunity set in the investment universe.

REFERENCES

Alighanbari, M., R. A.Subramanian and P. Kulkarni. (2014). "Factor Indexes in Perspective. Insights from 40 Years of Data. Part 1: The Study." MSCI Research Insight.

Briand, R., R. Urwin and C.P. Chia. (2011). "Integrating ESG into the Investment Process." MSCI Research Insight.

Desclee, A., L. Dynkin, A. Maitra and S. Polbennikov. (2016). "ESG Ratings and Performance of Corporate Bonds." Barclays Quantitative Portfolio Strategy Paper.

Eccles, R., M. Kastrapeli and S. Potter. (2017). "How to Integrate ESG into Investment-Decision Making: Results of a Global Survey of Institutional Investors." *Journal of Applied Corporate Finance*, Vol. 29, No. 4, pp. 125-133.

Hawley, J.P. and J. Lukomnik. (2018). "The Third, System Stage of Corporate Governance: Why Institutional Investors Need to Move Beyond Modern Portfolio Theory." Available at SSRN: https://ssrn.com/abstract=3127767 or http://dx.doi.org/10.2139/ssrn.3127767

Hermes Investment Management. (2016). "From Faith to Fact in ESG Exclusions: A Behind-the-scenes Analysis." Commentary, Q4.

Kang, X., F. Nielsen and G. Fachinotti. (2010). "The New Classic Asset Allocation?" MSCI Research Insight.

Nagy, Z., L.-E. Lee and M. Thwing Eastman. (2017). "Have Corporate Controversies Helped or Hurt Performance?" *Journal of Environmental Investing*, Vol. 8, No. 1.

OECD. (2017). "Investment Governance and the Integration of Environmental, Social and Governance Factors."

Schroders. (2017). "Demystifying Negative Screens: The Full Implications of ESG Exclusions." Research report.

APPENDIX

In our view, there are three key ingredients that an ESG benchmark must include.

1. **Underlying universe**

   To test whether ESG benchmarks can be used as alternatives or additions to standard market-cap benchmarks, we use the MSCI ACWI Index series, which covers large- and mid-cap stocks, as the underlying universe (Exhibit A1). For the MSCI ACWI Index, MSCI provides full coverage of ESG ratings for developed markets since 2007 and for emerging markets since 2012. This approach tests whether ESG indexes can be used to create regional sub-indexes, in the same way as for the parent MSCI ACWI Index.

Exhibit A1: Global Equity Benchmark: The MSCI ACWI Index Series

Many ESG index methodologies apply values-based exclusions to the base universe to screen out companies that are involved in highly controversial business activities. The MSCI ESG Universal Index,[21] which is designed to have minimal tracking error from its parent benchmark, excludes only companies involved in controversial weapons businesses and companies that are flagged as red[22] according to the MSCI ESG Controversies methodology. The MSCI ESG Leaders Index[23] applies additional exclusion screens to avoid investments in controversial activities[24] such as alcohol, tobacco,

[21] See MSCI ESG Universal Indexes Methodology. https://www.msci.com/eqb/methodology/meth_docs/ESG_Universal_Index_Methodology.pdf

[22] Red flags typically indicate a severe breach of international norms such as the UN Global Compact.

[23] See MSCI ESG Leaders Indexes Methodology https://www.msci.com/eqb/methodology/meth_docs/MSCI_ESG_Leaders_Indexes_Methodology_June_2017.pdf

[24] Companies whose revenues from controversial activities exceed 5% are excluded.

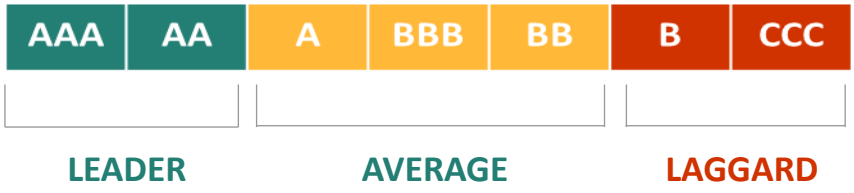
weapons manufacturing, gambling and nuclear power. Both index series exemplify how the financial objective of ESG integration is intertwined with the objective to create positive social side benefits.

2. ESG input score

There are two important ESG indicators that can be used to integrate ESG characteristics into an index construction methodology:

- The aggregate ESG score (numerical value) or a related ESG rating. To promote the creation of transparent and robust index methodologies, MSCI ESG Research uses a linear mapping of ESG scores to seven ESG rating classes (see Exhibit A2).
- ESG momentum (the year-on-year change of the aggregate ESG score).

Exhibit A2: MSCI ESG Rating Classes for Companies



As discussed in Part 1 of this paper, the aggregate *ESG score* is a good indicator for systematic and stock-specific risk and can help protect the benchmark universe from undesired risks. Thus, the use of the ESG score is essential within an ESG index methodology. In addition, *ESG momentum* may indicate an improvement in a company's risk profile and therefore may contribute to financial performance. Thus, we must determine whether and how to add ESG momentum to the ESG score itself.

3. Index methodology

We discuss two possible index methodologies:

i. **Top-level score:** Use the top-level ESG score as the only input in the ESG index methodology. This approach is adopted in the **MSCI ESG Leaders Index.**[25]

[25] See MSCI ESG Leaders Indexes Methodology https://www.msci.com/eqb/methodology/meth_docs/MSCI_ESG_Leaders_Indexes_Methodology_June_2017.pdf

This index methodology is based on a best-in-class selection[26] of companies from the parent index. The methodology selects the companies with the best MSCI ESG Ratings until the selected constituents reach 50% of the free-float market capitalization of the parent index. To minimize regional and sector biases, the selection is performed per GICS®[27] sector and region. To ensure a basic level of sustainability, only companies that have a rating of BB or higher are eligible for inclusion.[28]

ii. **Combined score:** Combine the top-level MSCI ESG Rating with the ESG momentum score, as used by the **MSCI ESG Universal Index**.[29] This index methodology keeps almost all constituents of the underlying universe[30] and applies the combined score as a scaling factor to constituent weights in the parent index.

We group each company along these dimensions:

i) Companies with leading, average and lagging ESG ratings

ii) Companies that have seen an improving, neutral or downward ESG rating trend over the past year

Exhibit A3 shows a simple grid for determining a combined score ranging between 0.5 and 2.0, which is used in the ESG Universal Index.[31]

[26] The index methodology applies some basic exclusions for companies involved in controversial activities, as explained in the index methodology.

[27] GICS is the global industry classification standard jointly developed by MSCI and Standard & Poor's.

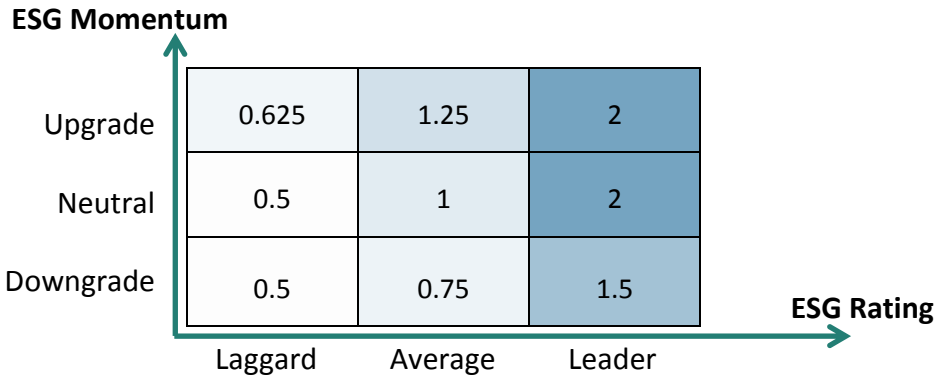
[28] A buffer rule is used to minimize turnover at each rebalancing, which allows existing index members to remain in the index as long as they have a minimum ESG rating of B.

[29] See MSCI ESG Universal Indexes Methodology. https://www.msci.com/eqb/methodology/meth_docs/ESG_Universal_Index_Methodology.pdf

[30] The only companies that are excluded from the underlying universe are companies which are involved in highly controversial activities, as explained in the index methodology.

[31] See MSCI ESG Universal Indexes Methodology https://www.msci.com/eqb/methodology/meth_docs/ESG_Universal_Index_Methodology.pdf

Exhibit A3: Combining ESG Rating and ESG Momentum into a Single Score



In brief, the methodology portrayed in Exhibit A3 aims to ensure that the combined score increases with both a company's MSCI ESG Rating and its ESG rating trend. At the top end, however, the combined score for leaders that were upgraded is capped at 2.0, to avoid disadvantaging leaders that can no longer improve their ratings. Similarly, the floor for the combined score for downgraded laggards is set at 0.5.

These two ESG index families illustrate two different approaches to integrate ESG — using MSCI ESG Ratings with best-in-class selection (MSCI ESG Leaders Index) versus using a combination of MSCI ESG Ratings and ESG momentum with an ESG-based tilt (MSCI ESG Universal Index).

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