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ESG investing–getting under the hood...

Environmental, Social, and Governance (ESG) investing has gathered significant momentum over recent years. This momentum has occurred as investors aim to include material extra-financial information into their investment process with the aim of improving the return characteristics of a portfolio.

While the traditional capital asset pricing model (CAPM) framework simply measures investments through the lens of risk and return, ESG investor preference must incorporate a measure of the risk and opportunity derived from absolute and relative differences on financially material E, S, and G parameters. Still, the impetus for capital allocation must be considerate of risk and return, and so we need to effectively quantify the risk and return impacts of ESG. ESG focused equity investors also need to use their investor influence with companies to encourage and require stronger corporate ESG practices and policies, as tilting an equity portfolio is on its own, unlikely to result in `real-world' change such as lower carbon emissions, improved equality and stronger board governance.

Robert Bush
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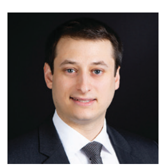

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Amidst the often quite complex topics of its overall intention and efficacy, how ESG metrics are quantified and defined, and how they are implemented in portfolios, we will instead use this paper to focus on two key issues:

_ The impact that an identical ESG methodology has on four distinct starting equity universes–the U.S., Europe, Australia, Far East (EAFE), Canada, and international emerging markets. Similarly, we conduct a back-test of a global. All Country World Index (ACWI)-weighted ESG Index composed of the regional ESG universes, assuming rebalancing back to the ACWI weights each month.
_ The relative drivers of excess returns within those universes, broken down into their Environmental, Social and Governance pillars (the word we will use to delineate the three components of ESG).

In undertaking this analysis, we hope to show that:

_ The starting region in which ESG is applied matters from a performance standpoint, and;
_ That the effect of the different pillars differs within each starting region.

DWS and the University of Hamburg meta study

This paper, invokes the spirit, if not the methodology, of a seminal meta-study conducted by DWS and the University of Hamburg in 2015 (see Bibliography) and expanded on in 2018.

In the DWS and the University of Hamburg report, the authors reviewed more than 2200 academic studies published on the topic of ESG and Corporate Financial Performance (CFP) over the last fifty year period.

The DWS and the University of Hamburg report, evaluated multiple ESG approaches to tease out regional distinctions. The 2018 paper goes on to examine the strength of the ESG-CFP relationship across various ESG dimensions to further explore the causality of ESG impact on investment performance.

In this paper, we examine just one methodology applied across regions. We then go on to analyze this methodology vis-à-vis each of the 3 pillars, E, S, and G to evaluate, through a quantitative lens, the drivers of performance among these pillars. What is interesting both papers' conclusions are mutually supported. In both cases, it is Emerging Markets where the impact of an ESG approach on corporate financial performances appeared to be most beneficial.

A DWS paper, Why Emerging Markets are Defined by ESG, published at the end of 2019 assessed the factors as to why ESG could be particularly relevant for emerging markets.

In our current paper, we assess this relationship from a more quantitative approach.

Data–The MSCI leaders indexes

Throughout this paper, we are using Morgan Stanley Capital International (MSCI) data for the four regions, under investigation: U.S. EAFE, Emerging Markets and Canada. We are evaluating these regions using an ESG-weighted approach ("the portfolio", and "dependent variable" in the regression), and a standard market-cap approach ("the benchmark", and "independent variable" in the regression). The MSCI ESG Leaders Index data used spans a common inception date for the respective regional indices using daily total return index levels (from 8/31/2010 to 10/31/2019).

Since we are using solely index data, we should acknowledge that we are not considering the impact of fees. Indexes, typically show returns gross of, or not accounting for, fees. Fees and expenses would typically have a negative impact on investment performance.

However, we are comfortable, for this analysis, using pre-fee returns for both the ESG-weighted approach which we refer to as "the portfolio" and the standard market-cap approach which we refer to as "the benchmark" for the simple reason that both strategies (market cap and ESG) can be accessed at quite similar fee levels (where it would clearly be more problematic to report a portfolio's performance gross of fees if those fees were substantially higher than the benchmark fees).

Crucially, the definition and application of the ESG metrics that we examined were consistent across starting universes, so we were comfortable concluding that any differences we uncovered were driven by the application of the approach itself within those regions, and not by varying methodologies across regions.

The ESG indexes are constructed using the MSCI Leaders methodology. Stated simply, the Leaders methodology adopts the following steps:

1. Remove from the starting universe securities that are involved in certain controversial business activities (e.g. Alcohol, Tobacco, Gambling, and Controversial Weapons).
2. Score the remaining securities across a subset of 37 key ESG issues that fall under ten themes.
3. Sort the securities by their ESG scores, with the highest scoring firms at the top. And, then, simply go down the list, within each sector, until around 50% of market cap is achieved (this last step achieves relatively neutral active sector weights to the market cap starting universe).

Our methodology

In a previous DWS white paper[1], Here's Where You Can Put It, we laid out the steps that we felt were necessary to evaluate any off-benchmark approach (under which label we include ESG). The steps were:

_ Determine a portfolio's historical returns
_ Assign an appropriate benchmark
_ Estimate alpha
_ Check that the alpha is positive and statistically significant, and, if so, economically meaningful
_ Estimate the approach's Tracking Error (TE), and Information Ratio (IR)

Only after all these steps have been followed would we suggest investors revert to discussions around how and why the approach is going off benchmark because, armed with the above information, they should be better-placed to gauge the trade-off between rationale, and performance.

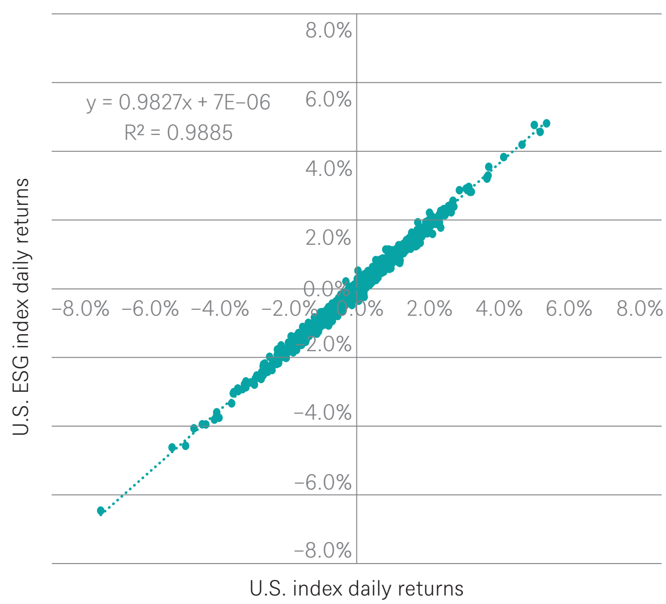
Following the above steps, we compared the performances of identical ESG methodologies the MSCI ESG Leaders indexes against their market cap starting universes (benchmarks), for the U.S., and developed, and emerging, international markets. The next section discusses.

Same approach, different start

USA

Figure 1 shows the scatterplot of daily excess returns over the risk free rate for the ESG index (y-axis) versus its market capitalization (cap) starting universe (x-axis) over time. Historically, it's clear at a glance that there was a very strong, highly correlated linear relationship between the two strategies.

FIGURE 1: SCATTERPLOT OF DAILY EXCESS RETURNS (OVER RISK FREE) OF THE MSCI USA MARKET CAP (X-AXIS) AND MSCI USA ESG LEADERS INDEXES (Y-AXIS) (8/31/2010 TO 10/31/2019)



Source: MSCI, Bloomberg as of 10/31/19. **Past performance may not be indicative of future results.** For illustrative purposes only and is not meant to represent any particular product.

[1] https://www.dws.com/US/EN/resources/insights/market-insights/BETA-WHITE_SmartBetaETFWhitepaper_FINAL.pdf

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However, the equation on the chart, and the output of the regression in Figure 2 really tell the story:

- Beta: Historically, the ESG index had a beta of 0.98 to the market cap index (this was statistically different from one, but, practically speaking, how different was a beta of 0.98 to the market beta of one?).
- Alpha: Historically, the daily alpha of the ESG index annualized to roughly 18 basis points (bps) but was not statistically significant at the 95% confidence level.
- Tracking Error: Historically, the ESG index had a tracking error (TE) of 1.53% (annualized) to the market-cap index.

So, our reading of this was that, historically over time in the U.S., the ESG approach was effectively offering investors a very similar index to market-cap, but with two important differences:

- A tracking error of 1.53%, from which one would conclude that the ESG index was likely to be within plus or minus 3.06% of the return to the market-cap index around 95% of 12-month periods.
- An index that eliminated the securities of firms that may not have been aligned with the investor's values. For those investors for whom this was true, we believe that it was possible to historically achieve a broadly similar profile to the benchmark, but with the "benefit" of removing firms, that may have high ESG risks or whose business models may not be aligned with an asset owner's investment beliefs.

FIGURE 2: THE OUTPUT FROM REGRESSING THE U.S. ESG INDEX ON THE U.S. MARKET CAP INDEX

Regression statistics

Multiple R	0.994
R Square	0.988
Adjusted R Square	0.988
Standard Error	0.001
Observations	2389

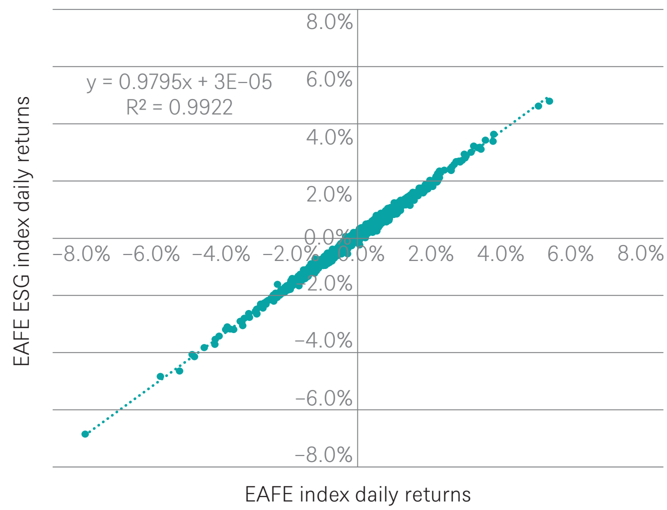
	Coefficients	Standard error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	0.001%	0.000	0.345	0.730	−0.003%	0.004%
MSCI USA	0.983	0.002	452.765	0.000	0.978	0.987

Source: MSCI, Bloomberg as of 10/31/19.

Figures 3 and 4 show the same analysis as before but this time the ESG Leader's methodology was applied to a starting universe of market-cap MSCI EAFE as opposed to the U.S., and then regressed on the EAFE market-cap index.

Europe, Australasia and Far East (EAFE)

FIGURE 3: SCATTERPLOT OF DAILY EXCESS RETURNS (OVER RISK FREE) OF THE MSCI EAFE MARKET CAP (X-AXIS) AND MSCI EAFE ESG LEADERS INDEXES (Y-AXIS) (8/31/2010 TO 10/31/2019)



Source: MSCI, Bloomberg as of 10/31/19. Past performance may not be indicative of future results. For illustrative purposes only and is not meant to represent any particular product.

As before, we looked at the key numbers over time to conclude:

- Beta: Although historically, the EAFE ESG index also had a beta of 0.98 to the market cap index (and, as before, though this was statistically significant we questioned its practical significance).
- Alpha: Historically, the daily alpha of the EAFE ESG index also rounded to 0.00% (annualized to 0.69%) and was not statistically significant at the 95% confidence level.
- Tracking Error: Historically, the EAFE ESG index had a tracking error (TE) of 1.26% (annualized) to the market-cap index.

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Given the above numbers, we drew the same conclusion for EAFE that we did for the U.S. – that over time, the ESG version of the index was not discernibly dissimilar from the market cap index from a performance standpoint. The two differences were; that it eliminated companies according to the above guidelines, and that it had a tracking error of around 1.3% to the market cap index as a result of that differentiation.

FIGURE 4: THE OUTPUT FROM REGRESSING THE EAFE ESG INDEX ON THE EAFE MARKET CAP INDEX

Regression statistics	
Multiple R	0.996
R Square	0.992
Adjusted R Square	0.992
Standard Error	0.001
Observations	2389

	Coefficients	**Standard error**	**t Stat**	**P-value**	**Lower 95%**	**Upper 95%**
Intercept	0.003%	0.000	1.703	0.089	0.000%	0.006%
MSCI EAFE	0.980	0.002	551.835	0.000	0.976	0.983

Source: MSCI, Bloomberg as of 10/31/19.

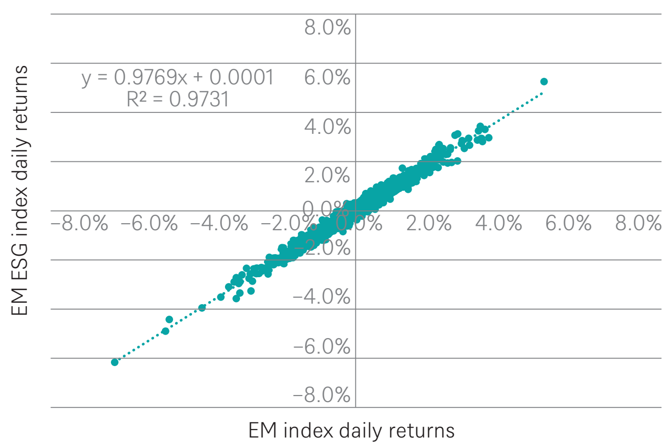
Emerging markets

The results of our analysis of MSCI EM indices, re-enforce the conclusions of the DWS and University of Hamburg meta-study of 2,000+ academic studies on the link between ESG and corporate financial performance. As well, a DWS report published in November 2019, examined "Why Emerging Markets are Defined by ESG."[2] These two reports found that:

- Emerging market countries are particularly exposed when it comes to environmental, social and governance issues such as population growth, income inequality, biodiversity loss, water stress, extreme weather events, corruption and forced labour.
- While many of these issues also exist across developed markets, the macro stability risks for emerging markets are more acute and the institutions available to address them weaker.
- Since emerging markets constitute 60% of world GDP[1] and 80% of the world's population[2], these hazards pose significant risks to the global economy. On our estimates, EM countries are forecast to contribute just over 75% of the 3.2% gain in world GDP growth this year.
- More than any other region, emerging markets display the strongest correlation between ESG and corporate financial performance
- Yet when it comes to the adoption of ESG initiatives, commitments in emerging markets are still relatively patchy. But not for long. We are already seeing central banks, supervisors and regulators across emerging markets moving in the area of ESG and they are set to become even more powerful agents of change in the months and years ahead.
- Greater sensitivity of EM economies to climate change, along with high pollution levels
- Firms with good ESG ratings were often operationally better (lower energy intensity, better employee engagement) which in the long run translated into better financials (growth, earnings, lower risk) and higher valuations

The results of our analysis of the MSCI Emerging Markets index is as follows:

FIGURE 5: SCATTERPLOT OF DAILY EXCESS RETURNS (OVER RISK FREE) OF THE MSCI EM MARKET CAP (X-AXIS) AND MSCI EM ESG LEADERS INDEXES (Y-AXIS) (8/31/2010 TO 10/31/2019)



Source: MSCI, Bloomberg as of 10/31/19. **Past performance may not be indicative of future results.** For illustrative purposes only and is not meant to represent any particular product.

[2] DWS November 2019 www.dws.com/solutions/esg/research

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Interestingly, and perhaps somewhat intuitively, when the application of an ESG methodology was applied in emerging market (EM) it historically appears to operate quite differently to the same application in developed markets.

Figure 5 shows the same scatterplot that we exhibited for the U.S. and EAFE, and Figure 6 shows the regression output. Clearly, there were some key differences:

- Beta: Historically, the EM ESG index had a beta of 0.98 to the market cap index. Again, this figure was close enough to 1 that we would argue beta drag was de minimis.
- Alpha: the daily alpha of the EM ESG index was 0.012% (a little over a basis point a day) but interestingly, this alpha was statistically different from zero (t-stat 3.79), and compounded to around 2.96% per annum.
- Tracking Error: Historically, we observed that the EM ESG index had a tracking error (TE) of 2.44% (annualized) to the market-cap index. Of course this number was around twice the tracking errors witnessed in the developed market cases but here, we would argue it was the positive alpha that put the tracking error in a very different context. The Information Ratio (IR) of the EM ESG index was around 1.2 (2.96% alpha divided by 2.44% tracking error) which meant that the decision to go off benchmark not only resulted in an index that was potentially more aligned with some investors' values, but also led to improved index performance (subject to all the caveats around this study analyzing empirical index data).

FIGURE 6: THE OUTPUT FROM REGRESSING THE EM ESG INDEX ON THE EM MARKET CAP INDEX

Regression statistics

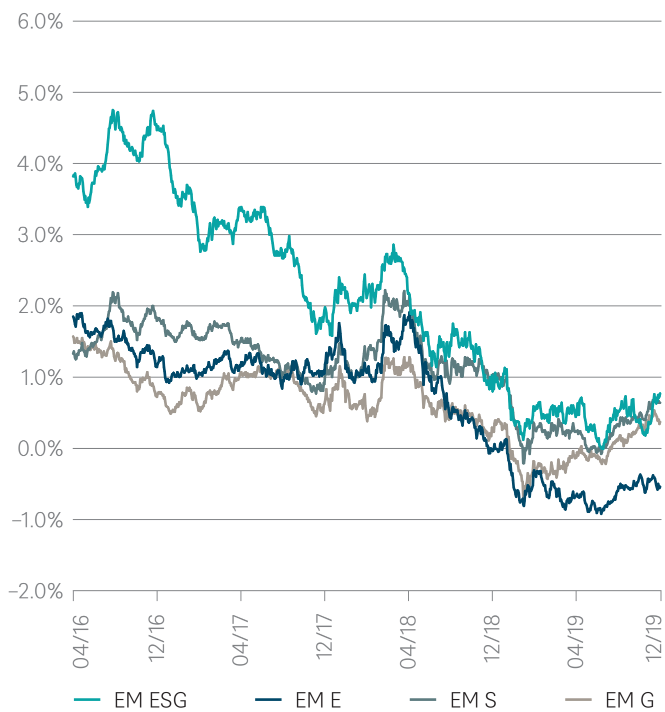
Multiple R	0.986
R Square	0.973
Adjusted R Square	0.973
Standard Error	0.15%
Observations	2389

	Coefficients	Standard error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	0.012%	0.000	3.756	0.000	0.006%	0.018%
MSCI EM	0.977	0.003	293.721	0.000	0.970	0.983

Source: MSCI, Bloomberg as of 10/31/19.

Despite the whole period alpha generation that we found from regressing all the EM data, it's important to caveat the findings with the rolling data seen in Figure 7 (where instead now of looking at the entire date range we used rolling three year periods). These charts are insightful because they speak not only to the overall story, but also allowed us to see the evolution over time—here it seems clear that the alpha generation has more recently declined. It's beyond the scope of this paper to try to conclude why this would be the case, but it seems reasonable to at least hypothesize that, if governance has been the main driver of that alpha, and we believe that companies have more likely been better run over time, then we might expect that opportunity to diminish accordingly.

FIGURE 7: ROLLING 3 YEAR ALPHA (ANNUALIZED) OF THE MSCI EM ESG INDEX AND E, S, AND G OVER THE MSCI EM MARKET CAP INDEX (5/31/2013 TO 10/31/2019)



Source: MSCI, Bloomberg as of 10/31/19. **Past performance may not be indicative of future results.**

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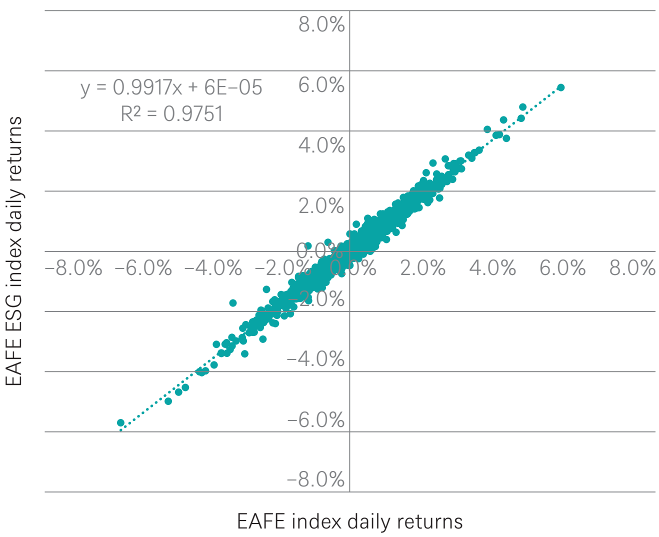
Canada

FIGURE 8: SCATTERPLOT OF DAILY EXCESS RETURNS (OVER RISK FREE) OF THE MSCI CANADA MARKET CAP (X-AXIS) AND MSCI CANADA ESG LEADERS INDEXES (Y-AXIS) (8/31/2010 TO 10/31/2019)



Source: MSCI, Bloomberg as of 10/31/19. **Past performance may not be indicative of future results.** For illustrative purposes only and is not meant to represent any particular product.

Similarly, we found that applying the ESG methodology to MSCI Canada has historically supplemented market returns.

Figure 8 shows a scatterplot of Canada ESG excess returns over the risk free rate to the excess returns of the vanilla MSCI Canada index. We observed the following results:

- Beta: Historically, the Canada ESG index had a beta of 0.99 to the market cap index. As with the other regional indices, while this number was statistically significantly different from one, there was no practical difference between the systematic risk of this index and the market cap weighted index.
- Alpha: Over time the daily alpha of the Canada ESG index was 0.006% (slightly less than a basis point a day) and statistically different from zero at the 10% confidence interval, but not at the 5% confidence level (p-value 0.059), and compounded to around 1.54% per annum.
- Tracking Error: The Canada ESG index had a tracking error (TE) of 2.50% (annualized) to the market-cap index. This figure was noticeably higher than other developed markets but pretty consistent with the tracking error of MSCI EM ESG to its market cap weighted equivalent. In terms of Information Ratio (IR), the Canada ESG index generated an IR of 0.62, which sufficiently outpaced the Sharpe Ratio of the Canadian equity market (0.34 for the period) over the same time frame and clearly demonstrated valuable performance for investors over the index history.

FIGURE 9: THE OUTPUT FROM REGRESSING THE CANADA ESG INDEX ON THE CANADA MARKET CAP INDEX

Regression statistics	
Multiple R	0.987
R Square	0.975
Adjusted R Square	0.975
Standard Error	0.16%
Observations	2389

	Coefficients	Standard error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	0.006%	0.000	1.890	0.059	0.000%	0.012%
MSCI Canada	0.992	0.003	305.872	0.000	0.985	0.998

Source: MSCI, Bloomberg as of 10/31/19.

Different pillars for different regions...

It's clear from the above section that our historical observations show the market itself was a large driver of the variability of returns to each of the corresponding ESG approaches (evidenced by all the high R-squared).

In this next section we took the analysis a step further and regressed the excess returns over the market of each of the Leaders methodologies against the excess returns of the individual E, S, and G components for reach respective equity region. These standalone E, S, and G pillars were created by MSCI via custom indexes (from 5/31/2013 to 10/31/2019, so a slightly shorter time frame in accordance with the MSCI custom index inception date), and, whilst not following

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the exact same methodology as the Leaders methodology, we deemed them to be satisfactory representations of the individual components.

The goal with these regressions was to ask the question, which, if any, of the E, S, or G best explained the excess returns of ESG Leaders in each region. Figures 10, 11, 12, and 14 show the output of these regressions, and the main conclusions that we drew from them.

FIGURE 10: THE OUTPUT FROM REGRESSING THE EXCESS RETURN ON THE U.S. ESG INDEX ON THE EXCESS RETURNS TO E, S, AND G

Regression statistics

Multiple R	0.266
R Square	0.071
Adjusted R Square	0.069
Standard Error	0.001
Observations	1674.000

Regressor	Coefficients	Standard error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	0.000	0.000	−1.597	0.110	0.000	0.000
USA E Excess	0.334	0.041	8.129	0.000	0.253	0.415
USA S Excess	0.131	0.043	3.038	0.002	0.046	0.215
USA G Excess	0.245	0.057	4.289	0.000	0.133	0.356

Source: MSCI as of 10/31/19.

R-squared too low to conclude that this regression was of interest.

FIGURE 11: THE OUTPUT FROM REGRESSING THE EXCESS RETURN ON THE EAFE ESG INDEX ON THE EXCESS RETURNS TO E, S, AND G

Regression statistics

Multiple R	0.529
R Square	0.279
Adjusted R Square	0.278
Standard Error	0.001
Observations	1674.000

Regressor	Coefficients	Standard error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	0.000	0.000	0.852	0.394	0.000	0.000
EAFE E Excess	0.245	0.054	4.552	0.000	0.139	0.350
EAFE S Excess	0.504	0.053	9.526	0.000	0.400	0.608
EAFE G Excess	0.238	0.023	10.412	0.000	0.193	0.283

Source: MSCI as of 10/31/19.

A still low, but better R-squared. The excess returns to the individual components explained nearly one third of the excess return of ESG Leaders over the market. All three components had statistically significant coefficients, but it's the social factor that had the highest beta (i.e. for a given 1.00% excess return to the social component, there would be, on average, 0.50% of excess return to the ESG Leaders methodology over the market in EAFE).

FIGURE 12: THE OUTPUT FROM REGRESSING THE EXCESS RETURN ON THE EM ESG INDEX ON THE EXCESS RETURNS TO E, S, AND G (6/30/2017 TO 10/31/2019)

Regression statistics

Multiple R	0.554
R Square	0.307
Adjusted R Square	0.306
Standard Error	0.001
Observations	1674.000

Regressor	Coefficients	Standard error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	0.000	0.000	2.017	0.044	0.000	0.000
EM E Excess	−0.163	0.039	−4.236	0.000	−0.239	−0.088
EM S Excess	0.344	0.046	7.534	0.000	0.254	0.433
EM G Excess	0.560	0.043	12.995	0.000	0.475	0.644

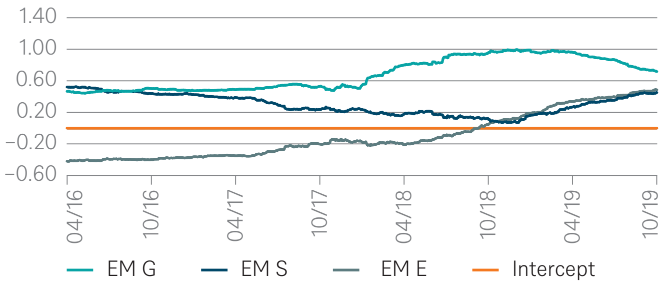
Source: MSCI as of 10/31/19.

In Emerging Markets (EM), the R^2 improved slightly to almost 0.31 and with, again, three statistically significant coefficients two points stand out. The first was the negative coefficient to the Environmental component, which suggested that higher environmental scores were actually associated with lower ESG excess returns in EM, and the second was the relatively higher beta to the Governance factor, which meant that, according to this analysis, it's this component that mostly explained the variability of the ESG excess returns in EM.

It is worth noting that more recently, the beta coefficient of the Environmental component has been more positive, suggesting that the sensitivity of EM ESG excess returns to E, S, and G, respectively, has been more evenly distributed as of late. Figure 13 shows the rolling 3 year regression of EM ESG excess returns over MSCI EM against E, S, and G. The upward trend in the EM E coefficient has been noticeable, having been positive for the past year. On the contrary, the beta factor loading of EM ESG to the governance factor, while still very positive, has been declining.

FIGURE 13: ROLLING 3 YEAR REGRESSION OF EM ESG EXCESS RETURNS OVER MSCI EM AGAINST E, S, AND G

Rolling 3yr Multi-Linear Regression Betas



Source: MSCI as of 10/31/19.

Looking at that period from June of 2017 to August of 2019 in isolation, how did the regression look for the full period? How did the more recent regime explain EM ESG alpha according to the three pillars?

In Canada, we can tell a similar story to the U.S. While we found statistically significant empirical alpha for ESG Canada, we had difficulty explaining this excess performance by simply regressing against the three respective pillars.

FIGURE 14: THE OUTPUT FROM REGRESSING THE EXCESS RETURN ON THE CANADA ESG INDEX ON THE EXCESS RETURNS TO E, S, AND G

Regression statistics

Multiple R	0.371
R Square	0.138
Adjusted R Square	0.136
Standard Error	0.001
Observations	1674.000

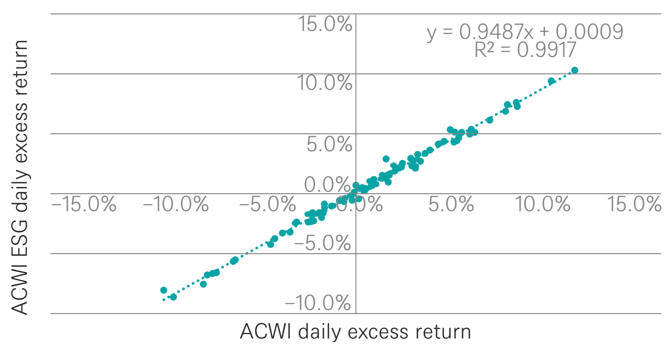
Regressor	Coefficients	Standard error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	0.000	0.000	1.484	0.138	0.000	0.000
Canada E Excess	0.289	0.039	7.429	0.000	0.213	0.365
Canada S Excess	0.355	0.062	5.709	0.000	0.233	0.477
Canada G Excess	0.215	0.052	4.150	0.000	0.114	0.317

Source: MSCI as of 10/31/19.

Combining regions...

The analysis of ESG within regions made apparent the regional disparities in the empirical impact of the ESG factors on performance, but what did this mean for ESG investors holistically? We can examine this impact historically by constructing an ESG-only equity index using ACWI monthly weights. Creating this back-tested, or hypothetical model, index assumes month-end rebalancing of the custom index to the ACWI country weights and does not incorporate potential transaction costs associated with this monthly rebalancing. Comparing the relative returns of ESG and Vanilla using ACWI weights, we output the following results:

FIGURE 15: SCATTERPLOT OF MONTHLY EXCESS RETURNS (OVER RISK FREE) OF THE MSCI ACWI MARKET CAP (X-AXIS) AND MSCI ACWI ESG LEADERS INDEXES (Y-AXIS) (8/31/2010 TO 10/31/2019)



Source: MSCI, Bloomberg, DWS Calculations as of 10/31/19. **Past performance may not be indicative of future results.** For illustrative purposes only and is not meant to represent any particular product.

FIGURE 16: THE OUTPUT FROM REGRESSING THE ACWI ESG INDEX ON THE ACWI MARKET CAP INDEX

Regression statistics

Multiple R	0.996
R Square	0.992
Adjusted R Square	0.992
Standard Error	0.3197%
Observations	110

	Coefficients	Standard error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	0.095%	0.0003126	3.023	0.003	0.033%	0.156%
MSCI ACWI	0.949	0.008	113.574	0.000	0.932	0.965

Source: MSCI, Bloomberg, DWS Calculations as of 10/31/19.

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When constructing an All Country World index from the individual ESG regions, we found results more consistent with our findings in Emerging Markets:

_ Beta: the ESG composite had a beta of 0.95 to the market cap index. This was statistically different from the underlying index

_ Alpha: the annualized alpha of ACWI ESG was 1.11%, with a t-stat of 3.023. The combination of statistically insignificant (U.S. and EAFE) to strongly positive (EM) alphas across regions, in addition to strong alpha diversification, which we will explore shortly, resulted in these positive back-tested results.

_ Tracking Error: the ESG index had a tracking error (TE) of 1.27% (annualized) to the market-cap index. Combined with the annualized alpha, this back-tested ESG ACWI index resulted in an Information Ratio (IR) or roughly 0.87.

Is there value to be derived from owning ESG across equity regions? What we found is, despite applying a consistent ESG methodology across markets, the correlations of the respective regional alphas was actually very low. In the same way that regional diversification within index construction helped to generate stronger risk adjusted returns, the diversification of the respective regional alphas can accomplish a similar result. In the table below, we show the correlations of the alphas of the various ESG indices across the U.S., EAFE, EM, and Canada.

FIGURE 17: CORRELATION OF ALPHAS ACROSS MSCI ACWI REGIONS

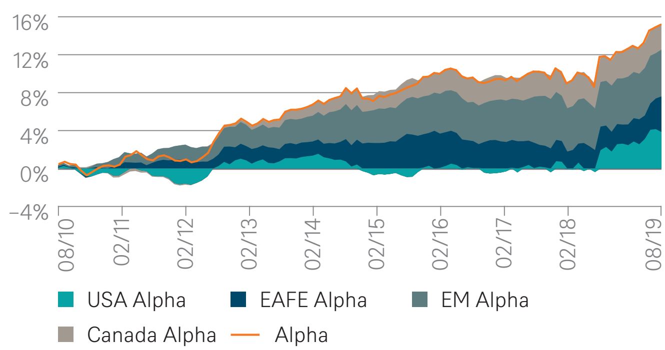
	USA	EAFE	EM	Canada
USA	1.00	0.07	0.11	–0.05
EAFE	0.07	1.00	0.28	–0.09
EM	0.11	0.28	1.00	0.01
Canada	–0.05	–0.09	0.01	1.00

Source: MSCI, Bloomberg, DWS Calculations as of 10/31/19.

In terms of alpha contribution, the results made intuitive sense, with most of the historical outperformance having been driven by Emerging Markets and Canada ESG in spite of the smaller weightings of EM and Canada in the index relative to the U.S. and EAFE. As we mentioned earlier in the paper, the empirical alpha that we found in USA and EAFE ESG was not statistically significant at the 95% confidence interval whereas EM and Canada results found much more robust evidence of alpha generation.

FIGURE 18: CONTRIBUTION TO MSCI ESG ACWI ALPHA BY REGION

MSCI ESG ACWI Alpha Contribution



Source: MSCI, Bloomberg, DWS Calculations as of 10/31/19.
Past perofrmance may not be indicative of future resuts.

Conclusions

This paper has attempted to get under the hood of ESG approaches in four regions to see if there were any interesting regional differences when the same method was applied to varying starting universes. Our conclusions were that:

_ In the U.S. and in EAFE, the ESG Leaders methodology ostensible results in a "market-like" portfolio, with similar beta to the market cap universe, statistically insignificant alpha, and a modest amount of tracking error.

_ We don't however feel that that was a bad result. It helps to reaffirm that integrating ESG does not lead to a sacrifice in terms of returns.

*Any back-tested performance referenced in this report is not an indicator of future actual results. The results reflect performance not [historically] offered to investors and do not represent returns that any investor actually attained. Back-tested results are calculated by the retroactive application of a model constructed on the basis of historical data and based on assumptions integral to the model which may or may not be testable and are subject to losses.

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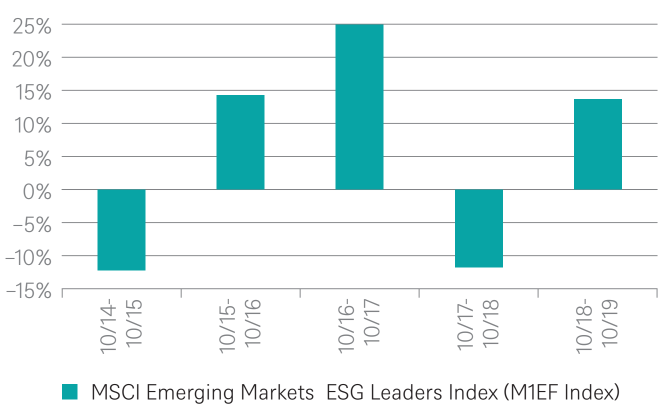
_ Indeed, we feel this raises a potentially thought provoking question to non-ESG investors – why hold poor scoring ESG stocks if they don't lead to any outperformance (or, analogously, if eliminating them doesn't detract from performance).
_ In EM, however, there appears to have been a statistically significant, and economically meaningful, alpha from applying the ESG Leaders methodology. Or, put another way, the ESG process seems to operate differently in Emerging Markets.
_ In Canada, the statistical significance of empirical alpha was more arguable. At the 90% confidence level, the ESG methodology has adequately compensated investors for the higher tracking error ESG has assumed relative to the U.S. and EAFE.
_ Speculating on why that might be so for EM (and to a lesser extent, Canada), and not for the U.S. and EAFE was challenging, but this is where the second stage of the analysis may provide some insight.
_ Now, it turns out that the three individual components explained more of the variability in ESG excess returns over the market in EM than in the U.S., EAFE, or Canada, and that it was mainly the Governance factor driving the excess return to ESG over the market in EM.
_ At an aggregate global equity level, the alpha generated across regions, with respect to the lack of statistically significant alpha in the U.S. and EAFE, was uncorrelated.
_ At this point, we should remind ourselves what the Governance metrics were.
  _ Governance focused on four Corporate Governance issues, and five Corporate Behavior issues
    _ Governance was: Board Composition, Ownership, Pay Structure, and Accounting.
    _ Behavior was: Ethics, Corruption, Anti-Competitive Practices, Impact on the Stability of the Financial System, and Tax Transparency
_ It's beyond the scope of this paper (and would require an additional twelve custom indexes!) to see if there was particular metrics of the Governance factor that matter more than others, but the fact is that it makes sense intuitively that better run companies should lead to better outcomes, and that there might conceivably be more scope to improve corporate governance in less developed markets and economies.

Appendix

PERFORMANCE OVER THE PAST 5 YEARS (12-month periods)



Source: MSCI as of February 2020. Note that the year ending date of 31 October coincides with the date of the analysis in this report.

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Glossary

Alpha: a measure of the active return on an investment. An investment's alpha is the excess return relative to the beta- adjusted market return.

One **basis point (bp)** equals 1/100 of a percentage point.

Beta: the measure of the volatility or systematic risk of a security or a portfolio in comparison to the market as a whole and is used in the capital asset pricing model (CAPM).

Capital Asset Pricing Model (CAPM): describes the relationship between risk and expected return and is used in the pricing of risky securities.

An **emerging market (EM)** is a country that has some characteristics of a developed market in terms of market efficiency, liquidity and other factors, but does not meet standards to be a developed market.

Environmental, social and governance (ESG) issues refer to non-financial issues that may affect the sustainability of an investment.

Europe, Australasia and the Far East (EAFE) refers to the most developed geographical areas of the world outside the United States and Canada.

Multiple R is the correlation coefficient. It tells how strong the linear relationship is. For example, a value of 1 means a perfect positive relationship and a value of zero means no relationship at all.

Regression: a statistical measure of the relation between the mean value of one variable (output) and corresponding values of other variables (such as time and cost).

R-squared (R2) is a statistical measure that represents the proportion of the variance for a dependent variable that's explained by an independent variable or variables in a regression model.

The adjusted R-squared is a modified version of R-squared that has been adjusted for the number of predictors in the model. The adjusted R-squared increases only if the new term improves the model more than would be expected by chance. It decreases when a predictor improves the model by less than expected by chance.

Standard error is a measure of the statistical accuracy of an estimate, equal to the standard deviation of the theoretical distribution of a large population of such estimates.

Standard Deviation: often used to represent the volatility of an investment. It depicts how widely an investment's returns vary from the investment's average return over a certain period.

T-statistic: used to test hypotheses. It is a ratio of the departure of an estimated parameter from its notional value (total value of a leveraged position's assets) and its standard deviation (volatility).

Tracking Error: a divergence between the price behavior of a position or a portfolio and the price behavior of a benchmark.

Index definitions

The MSCI All-Country World (ACWI) Index captures large- and mid-cap companies across nearly two dozen developed and two dozen emerging market countries, with the exception of the United States.

The MSCI ACWI ex USA ESG Leaders Index is a capitalization weighted index that provides exposure to companies with high Environmental, Social and Governance (ESG) performance relative to their sector peers. MSCI ACWI ex USA ESG Leaders Index consists of large and mid cap companies across 22 Developed Markets (DM) and 24 Emerging Markets (EM) countries*. The Index is designed for investors seeking a broad, diversified sustainability benchmark with relatively low tracking error to the underlying equity market. The index is a member of the MSCI ESG Leaders Index series. Constituent selection is based on data from MSCI ESG Research.

The MSCI Emerging Markets (EM) Large Cap Index includes large-cap representation across 26 Emerging Markets countries*. With 782 constituents, the index covers approximately 70% of the free float-adjusted market capitalization in each country.

The MSCI Emerging Markets (EM) ESG Leaders Index, is a capitalization weighted index that provides exposure to companies with high Environmental, Social and Governance (ESG) performance relative to their sector peers.

The MSCI Canada ESG Leaders Index is a capitalization weighted index that provides exposure to companies with high Environmental, Social and Governance (ESG) performance relative to their sector peers. MSCI Canada ESG Leaders Index consists of large and mid cap companies in the Canadian markets.

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