PGIM QUANTITATIVE SOLUTIONS

ESG SOLUTIONS: A STRONG ALTERNATIVE TO ESG INDEXES

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ABOUT PGIM QUANTITATIVE SOLUTIONS

PGIM Quantitative Solutions began managing multi-asset portfolios for institutional investors in 1975. Today, we manage systematic quantitative equity and global multi-asset strategies as part of PGIM, the global investment management businesses of Prudential Financial, Inc. (PFI). Our investment processes, based on academic, economic and behavioral foundations, serve a global client base with $120.3 billion in assets under management as of 12/31/2020.

FOR MORE INFORMATION

To learn more about our capabilities, please contact PGIM Quantitative Solutions by email at contactus@pgim.com or by phone in the US at +1 (866) 748-0643 or in the UK at +44 (0) 20-7663-3400.

INTRODUCTION

Over the past decade, asset owners have significantly increased their contributions to passive equity investments, which often help frame the overall policy benchmark for their equity allocation. This move reflects a growing preference to capture broad market exposures in a cost-effective manner. With an increased focus on ESG, asset owners are faced with the difficult challenge of deciding how to evolve their investments in traditional broad market indices to better capture the goal of improving their ESG portfolio profile. Over the last year, there has been a 40% increase in the number of ESG indexes for investors to choose from.[1] Index providers and asset managers have constructed ever-more sophisticated solutions to try to meet the rapidly evolving investor demand for sustainable solutions. To this end, ESG indexing strategies are a popular choice, but we believe they may be a suboptimal solution for asset owners — from both an investment performance and a sustainability perspective.

Performance and Sustainability Issues

ESG indexes can suffer from a performance perspective for two main reasons:

1) Indexes generally seek to improve ESG in isolation from risk and return characteristics. This may increase tracking error and performance volatility from the underlying policy benchmark.
2) Indexes are unable to continually adapt to changing market and individual company conditions, effectively taking a single-factor smart beta investment approach.

ESG index solutions also differ dramatically in terms of their overall ESG profile and areas of focus. The indexes that deliver the most market-like risk and returns can only do so by holding almost the entire underlying index. From a sustainability perspective, these broad ESG index strategies are limited in their ability to meaningfully tilt to better ESG companies and away from those with poor ESG profiles. Without a more careful and focused stock selection process, it's nearly impossible to meaningfully improve the strength and quality of ESG in the portfolio.

We believe that investors need to stay active in order to effectively capture opportunities

[1] Index Industry Association 2020 survey: http://www.indexindustry.org/insights/

and mitigate risks in this fast evolving space, and an active ESG solution can be a powerful indexing alternative. Central to PGIM Quantitative Solutions ESG capabilities is the belief that ESG insights should be integrated and balanced against other performance drivers. This not only improves the performance features of our solution — delivering a risk and return profile similar to the original policy benchmark — it also improves the quality of the resulting ESG exposure.

PGIM Quantitative Solutions multi-dimensional ESG approach is highly transparent, with easily identifiable areas of ESG improvement. Our proprietary ESG process continues to evolve and adapt, incorporating the latest fundamental and ESG information, along with ongoing process enhancements.

PGIM Quantitative Solutions ESG Approach

ESG investing revolves around the belief that a company's success depends on its interactions and relationships with various stakeholders: customers, employees, communities, suppliers and the environment. Our goal is to measure the quality of a firm's relationships with these stakeholders.

To create an ESG score, we recognize that key stakeholders and corresponding ESG issues vary in importance across industries. We evaluate ESG characteristics for each company through a framework designed by the non-profit Sustainability Accounting Standards Board (SASB). PGIM Quantitative Solutions utilizes this framework to produce a proprietary ESG score for every stock in the investment universe. We consider only ESG issues that are material within each industry, as determined through group consensus among issuers, corporate experts and investors. This helps ensure that we are viewing companies holistically, as well as consistently, with other investment experts.

Our quantitative expertise helps us translate these insights into intuitive and effective ESG scores. We carefully select and combine ESG metrics to evaluate each material issue for each stock in a given sector. We balance inputs from policy metrics with other quantifiable metrics to ensure that a firm's purported sustainability efforts are supported by observable actions. This reduces concerns of falling into ESG "traps."

Solving for Sparse ESG Data

ESG data is largely self-reported by individual companies, so it is frequently unavailable and/or unreliable across markets. PGIM Quantitative Solutions overcomes the resulting lack of breadth through the use of our proprietary data completion methodology, which expands the ESG stock selection universe and allows us to fill in where ESG data is missing. In PGIM Quantitative Solutions approach, no companies escape scrutiny and inclusion.

Integrating ESG Into Portfolios

High-ESG companies are not necessarily attractive investments. An effective ESG portfolio must carefully balance insights into sustainability with performance and risk drivers. Such a balanced approach helps identify opportunities where the benefits of ESG are mispriced, thereby avoiding performance drag from overly expensive ESG names.

We recognize that despite best efforts, ESG data and scores can be noisy measures. To reduce noise and increase confidence in ESG opportunities, we incorporate fundamental quality inputs, which are intended to identify companies where financial performance is more persistent and are expected to correlate with improved sustainability practices. The combination of fundamental quality with ESG quality helps target true ESG opportunities.

A similar motivation applies to incorporating growth attributes into the investment process. A firm that is serious about managing stakeholder relations (not just directing resources towards creating an ESG façade) is more likely to benefit from improved fundamental performance in the future. It also helps to manage additional risk exposures (e.g., size) to control volatility and improve the quality of ESG exposures.

Naïve targeting of "good" ESG stocks can inadvertently lead to a portfolio with a significant large-cap tilt, since larger companies have more resources to devote to sustainability efforts and can put in place more ESG policies. The greater volume of policies can create a misleading impression that large companies are "better" from an sustainability perspective. Size controls on a portfolio limit the tilt toward such ESG traps.

ESG Indexing Alternative

PGIM Quantitative Solutions only selects stocks with attractive ESG scores that keep the portfolio's risk and return characteristics intact. We will not select a sustainable company for inclusion that introduces unintended factor exposures. Our approach yields an ESG solution that is risk controlled, positioned to outperform, and has a meaningfully improved ESG profile.

We seek to consistently deliver:[2]

- Improved ESG exposures
- Performance comparable to the benchmark
- Low tracking error
- Beta of ~1.

Comparative results for our simulated ESG portfolio vs. several MSCI ESG indexes are shown in Figure 1. In this solution, we target a 20% improvement in the PGIM Quantitative Solutions ESG score relative to the MSCI World Index, while keeping risk and return attributes aligned with the benchmark.

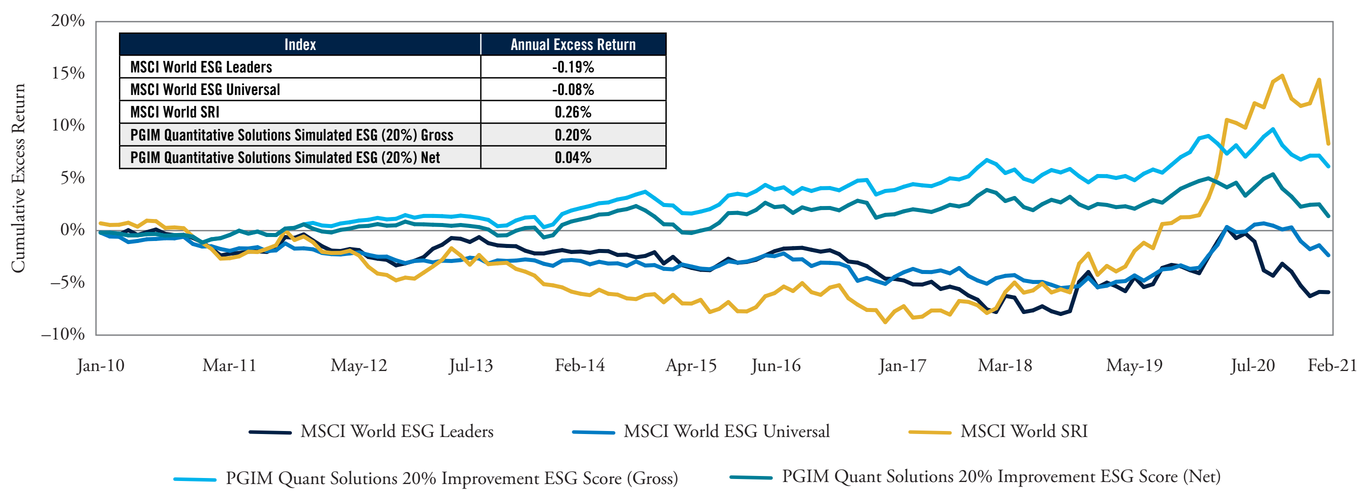
The chart highlights several key points:

1) PGIM Quantitative Solutions ESG solution shows more consistent returns through a variety of market conditions.
2) Our cumulative simulated outperformance over the last decade is meaningful.
3) The MSCI World SRI Index, which, like most ESG indexes, performed very well in 2020, has been most impacted by its ESG framework. It had its worst month since 2010 in February 2021, underperforming the MSCI World Index by -2.06%. In contrast, our strategy experienced more modest underperformance of -0.39% gross of fees.

We believe the MSCI World SRI Index was impacted by weaker risk management and the absence of other investment insights. The index was overweight the Information Technology sector and expensive, high-momentum names. A rotation in sentiment away from these names contributed to significant volatility. In contrast, our approach has tighter controls on active sector and industry exposures, balancing ESG exposure with inputs such as valuation.

Figure 1: Performance Comparison

Cumulative Excess Returns of MSCI ESG Indexes and Simulated PGIM Quantitative Solutions ESG Portfolio vs. MSCI World



Index	Annual Excess Return
MSCI World ESG Leaders	-0.19%
MSCI World ESG Universal	-0.08%
MSCI World SRI	0.26%
PGIM Quantitative Solutions Simulated ESG (20%) Gross	0.20%
PGIM Quantitative Solutions Simulated ESG (20%) Net	0.04%

From 1/31/2010 to 2/28/2021. Inception of the Simulated PGIM Quantitative Solutions 20% Improvement in ESG Score strategy is 1/31/2010.

Source: PGIM Quantitative Solutions MSCI.

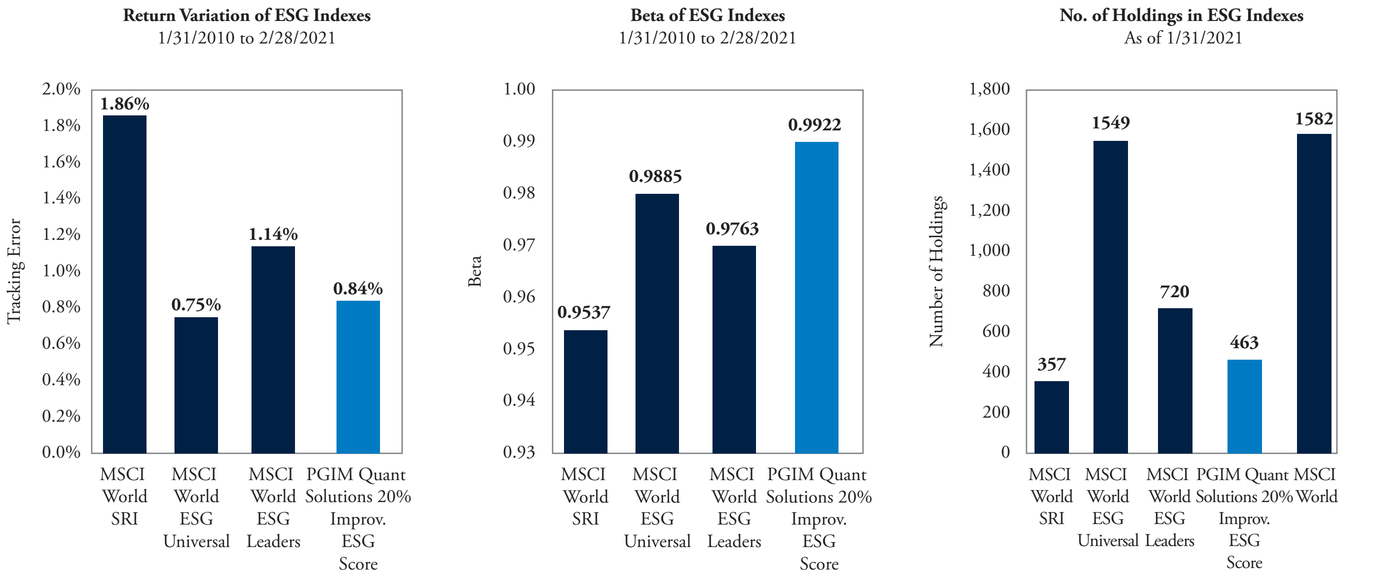
Shown for illustrative purposes only. There can be no guarantee that the objective will be achieved. No investment strategy or risk management technique can guarantee returns or eliminate risk in any market environment. The simulated results shown above do not represent the results of actual trading, but were achieved by retroactive application of a model designed with the benefit of hindsight. The simulation shown has significant inherent shortcomings and does not consider many real-world frictions such as cash balances, intra-month trades, timing of the reinvestment of dividends and the ability to trade at various prices. Results are not guaranteed. Please see 'Notes to Disclosure' and 'Notes to Disclosure for Simulated Performance' pages for important information including risk factors, disclosures, and additional assumptions and portfolio construction details.

[2] There is no guarantee these objectives will be achieved.

Comparisons of PGIM Quantitative Solutions ESG risk characteristics with MSCI indexes are shown in Figure 2. As seen below, our tracking error for this calibrated solution is between 70-80 bps and the beta of our strategy to the MSCI World index is close to 1. While the MSCI World ESG Universal Index has a similar tracking error and beta to our solution, it holds virtually all stocks in the index. It is hard to argue that this translates into an enhanced ESG profile.

On the other hand, the MSCI World SRI Index holds a smaller set of securities, suggesting an improved ESG profile. Implementation of this approach, however, comes with tracking error of almost 1.8% and a beta of 0.95. These common ESG index solutions struggle to balance the pursuit of ESG with delivering performance comparable to the benchmark. In contrast, our solution achieves more meaningful ESG exposure with a more targeted approach to stock selection

Figure 2 – Performance Comparison – T/E, Beta, Holdings



From 1/31/2010 to 2/28/2021. Inception of the Simulated PGIM Quantitative Solutions 20% Improvement of the ESG Score strategy is 1/31/2010.

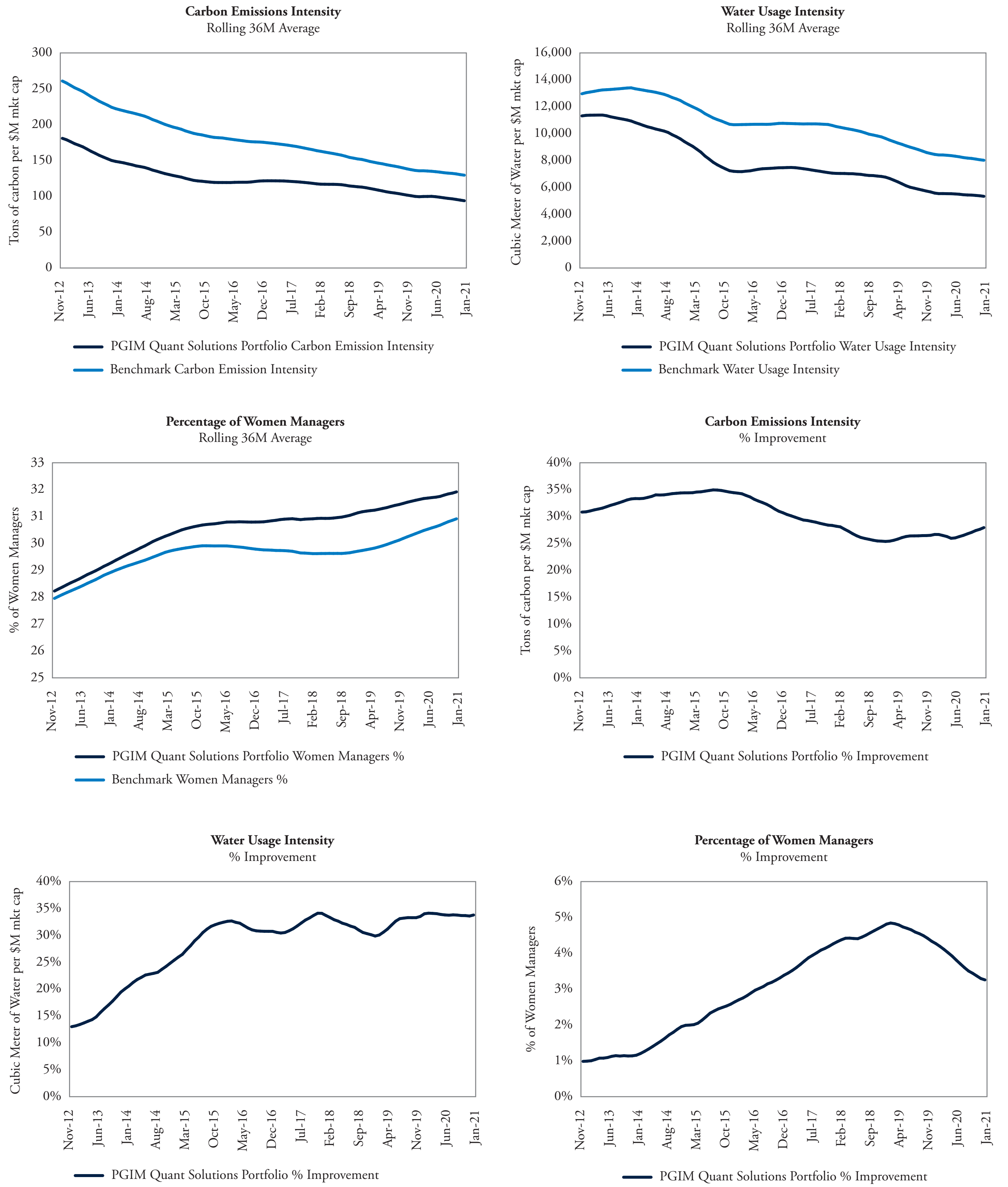
Source: PGIM Quantitative Solutions , MSCI.

Shown for illustrative purposes only. Holdings are subject to change and these results are not guaranteed.

There can be no guarantee that the objective will be achieved. Please see 'Notes to Disclosure' and 'Notes to Disclosure for Simulated Performance' pages for important information including risk factors, disclosures, and additional assumptions and portfolio construction details.

Figure 3 shows the enhanced exposures to three high-profile ESG attributes – carbon emission intensity, water usage intensity and diversity. ESG investors commonly focus on these attributes, as they have better data coverage and are a quantitative measure, making the metric more informative. Based on this simulation, our solution delivers a consistent ~30% improvement in carbon emission intensity and water usage intensity, as well as a 4% improvement in diversity.

Figure 3 – Meaningful Improvements in ESG



From 11/30/2012 to 1/31/2021. Benchmark: MSCI World Index.

Source: PGIM Quantitative Solutions. Shown for illustrative purposes only. Please see 'Notes to Disclosure' page for Important Information including risk factors and other disclosures.

We recognize that asset owners have varying preferences for ESG exposure. PGIM Quantitative Solutions ESG solution can accommodate these differences by calibrating higher active risk options, which afford stronger ESG exposure. Similarly, we can amplify specific ESG attributes (e.g., carbon emission intensity) to meet different clients' ESG objectives. As quantitative managers we can also help inform the decision-making process to deliver a solution that best fits each investor's preference.

Conclusion

Many asset owners with a desire to increase their ESG exposure are investing in ESG indexes. But ESG indexing is not a "no risk" approach. ESG itself is a potential driver of risk and return and a passive allocation to an ESG index is therefore an active investment decision. Applying a static indexing approach in this rapidly evolving area may not be the safest way forward.

PGIM Quantitative Solutions ESG solution seeks improved ESG outcomes accompanied by a risk and return profile closer to the underlying policy benchmark than a typical ESG index.

Through the careful integration and balancing of ESG insights with other performance drivers, investors can capture market-like performance while improving their overall ESG profile. This also makes for more seamless solutions, as investors are able to retain their existing policy benchmarks.

Every position taken relative to the index is a conscious choice by us as an active manager, rather than an inadvertent decision flowing from a broad indexation rule. We can also increase sustainability attributes for clients willing to accommodate a corresponding deviation from the benchmark. The final portfolio retains full transparency down to the individual security level. Asset owners looking to improve their ESG exposure without taking on additional risk should consider our active, integrated ESG approach as an alternative to ESG indexing.

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Notes to Disclosure

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Notes to Disclosure for Simulated Performance

PGIM Quantitative Solutions 20% Improvement in the ESG Score Strategy

The simulated performance included in this document are for the purpose of illustrating the performance returns of a PGIM Quantitative Solutions 20% Improvement in the ESG Score strategy for the period of January 31, 2010 through February 28, 2021. The information is for illustrative purposes only, does not constitute investment advice, and is not indicative or a guarantee of future results. The performance of the PGIM Quantitative Solutions 20% Improvement in the ESG Score strategies are simulated because there is no current PGIM Quantitative Solutions strategy using these portfolio constituents or benchmark.

The simulated results were derived using certain assumptions and do not reflect the deduction of advisory fees and taxes. Deductions of such amounts would reduce overall returns. The simulated performance of the strategy assumes monthly portfolio rebalancing, turnover of 10% per month, trading limited to 10% average daily volume, trading costs of 25 bps per trade, and specific risk constraints relative to the benchmark of individual stock (+/- 0.25%), industry exposure (+/- 1.00%), sector exposure (+/- 0.25%), region exposure (+/- 1.00%), country exposure (+/- 1.00%).

The simulated performance is initially based on monthly rebalancing and ignores such real-world frictions as cash balances, intra-month trades, timing of the reinvestment of dividends, market volatility, and the ability to trade at various prices. It is then adjusted to reflect such frictions by using the average return difference between the simulated Core performance and the actual Core performance.

In order to establish ESG ratings for securities in its investment universe, PGIM Quantitative Solutions utilizes a combination of information from issuers and data providers and its own proprietary methodology for determining ESG characteristics of an issuer where such data is incomplete or unavailable. PGIM Quantitative Solutions process for evaluating securities based on ESG factors may prove not to be predictive of a company's ESG status or performance. In addition, the potential benefits to a company of having "good" ESG characteristics may be long term and not visible in performance (or otherwise) for many years, if at all.

Future portfolio results may not be profitable and characteristics of our strategy may change in the future. There can be no assurance that the actual performance would achieve the results shown in the simulations.

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Investing in securities involves risk of loss that investors should be prepared to bear. In addition, model-based strategies present unique risks that may result in the model's not performing as expected. These risks include, for example, design flaws in the model; input, coding or similar errors; technology disruptions that make model implementation difficult or impossible; and errors in externally supplied data utilized in models. To the extent that portfolio manager judgment is applied to model output, decisions based on judgment may detract from the investment performance that might otherwise be generated by the model.

The MSCI World Index is a free-float adjusted market capitalization index that is designed to measure global developed market equity performance. The index is net of foreign withholding tax using the Luxembourg tax rate.