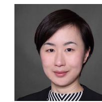
Integrating ESG Preferences in Asset Allocation

Optimizing with an added ESG risk constraint.

November 2023

KEY INSIGHTS

- Incorporating ESG factors into our investment process alongside economic, valuation and other factors may help our clients to meet their long-term goals.[1]
- We show how scores from our proprietary Responsible Investing Indicator Model (RIIM) may help to drive asset allocation in ESG-aware multi-asset portfolios.
- Our framework allows us to adjust portfolio asset allocation in order to incorporate ESG preferences in a consistent manner.



Wenting Shen
Solutions Strategist and Portfolio Manager
Global Multi-Asset Team

Nathan Wang
Solutions Analyst
Global Multi-Asset Team

We introduced an asset allocation framework for incorporating ESG preferences systematically in an earlier paper[2]. It used hypothetical examples to illustrate how to add a third dimension to the traditional two-dimensional efficient frontier of portfolio returns and risk, allowing investors to take into consideration their ESG risk tolerance - in addition to return and risk objectives - when constructing a multi-asset portfolio.

This paper is a natural extension to the first whereby the focus of the paper is on optimization around specific ESG pillars. We rely primarily on our proprietary Responsible Investing Indicator Model (RIIM), which develops an environmental, social and governance profile for corporate, sovereign, municipal and securitized securities using both qualitative and quantitative measures. It provides a systematic framework for measuring and comparing the ESG characteristics of over 15,000 corporate securities in addition to sovereign, securitized and municipal issuers. Because this model sets a common language for our investment professionals to evaluate ESG risks across asset classes, the ESG scores from RIIM can be used to help drive the asset allocation of ESG-aware portfolios, with the ability to focus on specific sustainability topics.

More specifically, RIIM produces scores for each of the three pillars of ESG – environmental, social and governance. Instead of utilizing aggregate ESG risk scores, we can focus on specific environmental, social, or governance aspects in building the overall score for each asset class. Disaggregating the

> A consistent ESG scoring methodology across asset classes can be used to drive the asset allocation of ESG-aware portfolios.

[1] Incorporating ESG factors in asset allocation may lead to suboptimal portfolios from an investment perspective. Therefore, adjusting portfolios for ESG criteria may not be appropriate for all investors, particularly for those who focus exclusively on investment outcomes rather than on ESG preferences in addition.
[2] See "Adjusting Asset Allocation for ESG Preferences," Y Lustig, S Toy, R Panariello, and T Poullaouec, September 2022.

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For illustration purposes, we have constructed a series of multi-asset portfolios that focus on environmental risks.

ratings allows us to consider the elements within ESG that are the more relevant for each investor or strategy.

Before delving into the details, it is worth noting that while RIIM is our preferred ESG risk rating framework, the same asset allocation approach works for other ESG scoring systems too. What is important is that ratings across asset classes should be based on a single source of ESG risk scores so that they can be compared consistently.

For illustration purposes, we have constructed a series of multi-asset portfolios that focus on environmental risks. The same approach can be applied to ESG social and governance risks as well.

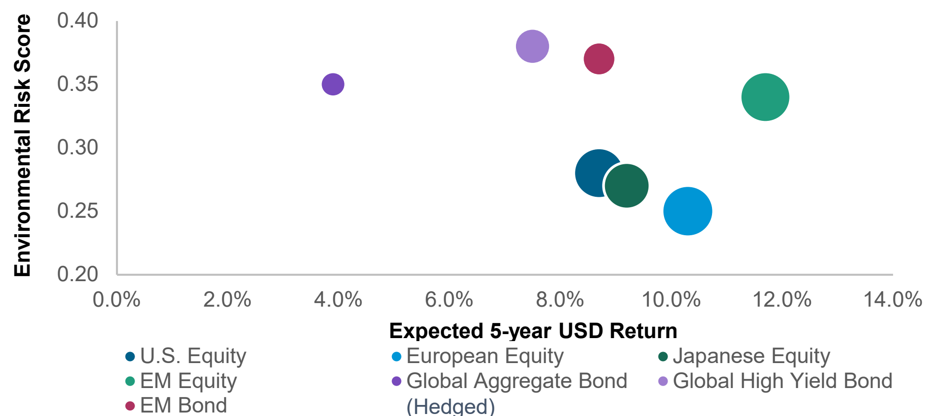
Investment Assumptions and Constraints

Our starting point is a balanced portfolio consisting of 60% global equities and 40% global bonds. We then apply the following assumptions and constraints to the portfolio design:

- The investment universe is comprised of major regional equity building blocks (i.e., the U.S., Europe, Japan, and Emerging Markets) and fixed income sectors (i.e., Global Aggregate, Global High Yield, and Emerging Markets Bonds) in order to construct a diversified global portfolio.
- Return forecasts for different asset classes are based on our 5-year Capital Markets Assumptions (CMAs). Volatilities are constructed using historical return data over the past 5 years to reflect the most recent market environment (See Figures 1 and 2).
- Environmental risk scores are aggregated scores of individual securities at the asset class level based on our RIIM. The higher the score is, the more environmental risk the asset class carries.

Assumptions For Portfolio Optimization With ESG Constraints

(Fig. 1)



The analysis in Figure 1 is based on the forecasts contained herein are for illustrative purposes only and are not indicative of future results.
Based on T. Rowe Price 5-Year Capital Markets Assumptions (CMAs) and RIIM Model. This study differs from the CMA in that it employs the S&P500 index in place of the Russell US Large Cap index to represent US equity and the ICE BofA Global HY Index in place of the Bloomberg Corp HY index to represent global high yield bonds.
In Figure 1 the size of each bubble is proportional to the volatility of each asset class.
As of June 30, 2023.
Sources: ICE BofA, J.P. Morgan, S&P, MSCI, Bloomberg Finance L.P. Analysis by T. Rowe Price. See Additional Disclosures for sourcing information.
This information is not intended to be investment advice or a recommendation to take any particular investment action. Forecasts are based on subjective estimates about market environments that may never occur. See the Appendix for Important Information on our capital market assumption and a representative list of indexes for the seven asset classes in Figure 1.
Expected returns are shown for asset classes without consideration of fees and expenses.

- The allocation design of the initial portfolio is illustrated in Figure 3, in which regional equity allocations are based on country weights in the MSCI All Country World Index (ACWI) and fixed income sector allocations are based on the Global Multi-Asset team's understanding of a typical global 60/40 balanced fund.
- In the optimization analysis (Figure 4 on the next page), we set a 3.0% limit for the tracking error to the initial portfolio for two reasons: 1) it is an investment constraint common to institutional clients, so it mirrors real world experience; 2) it anchors the portfolio design to the benchmark thereby removing extreme solutions from the optimization process.
- We set the constraint of a minimum single holding allocation of 3% and a maximum single holding allocation of 30% to ensure portfolio diversification and to avoid corner solutions.
- We did not constrain the equity/fixed income mix in order to leave more room for the optimizer to find allocations with better risk-adjusted returns and mitigated environmental risk.

Asset Class Past 5-Year Monthly U.S. Dollar Return Correlations

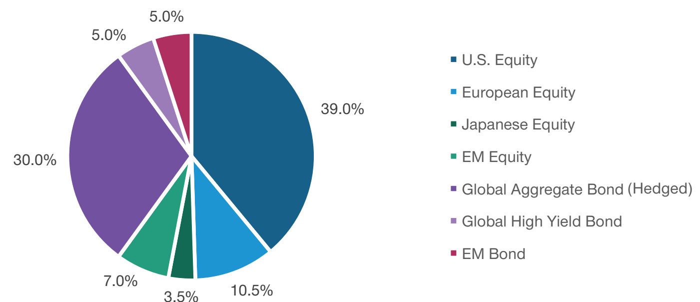
(Fig. 2)

	U.S. Equity	European Equity	Japanese Equity	EM Equity	Global Aggregate Bond (Hedged)	Global High Yield Bond	EM Bond
U.S. Equity	1.00						
European Equity	0.88	1.00					
Japanese Equity	0.80	0.82	1.00				
EM Equity	0.73	0.79	0.74	1.00			
Global Aggregate Bond (Hedged)	0.44	0.41	0.41	0.42	1.00		
Global High Yield Bond	0.81	0.81	0.73	0.76	0.56	1.00	
EM Bond	0.61	0.68	0.60	0.76	0.60	0.89	1.00

As of June 30, 2023.
Sources: ICE BofA, J.P. Morgan, S&P, MSCI, Bloomberg Finance L.P. Analysis by T. Rowe Price. See Additional Disclosures for sourcing information.
See Appendix for a representative list of indexes.

The Initial Portfolio

(Fig. 3)



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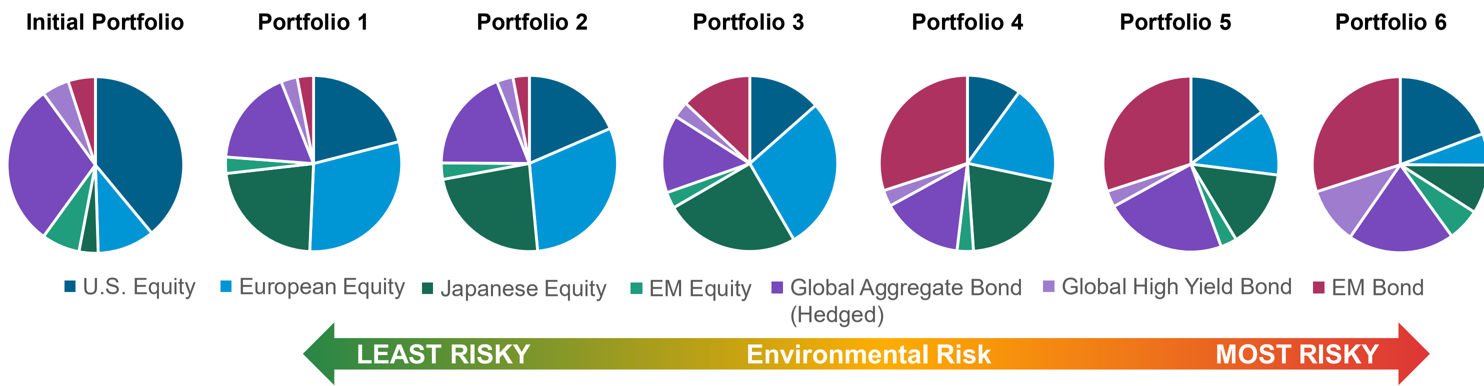
As of June 30, 2023.
Source: T. Rowe Price.
See Appendix for a representative list of indexes.

Optimization Results Summary For Environmental Risk-Constrained Portfolios

(Fig. 4) Returns are in U.S. dollars



	Initial Portfolio	Portfolio 1	Portfolio 2	Portfolio 3	Portfolio 4	Portfolio 5	Portfolio 6
Portfolio Characteristics							
Expected 5-year Return (annualized)	7.6%	8.5%	8.4%	8.6%	8.4%	7.9%	8.0%
Expected 5-year Volatility (annualized)	12.0%	13.7%	13.5%	13.0%	11.0%	10.1%	10.0%
Return/Risk Ratio	0.63	0.62	0.63	0.67	0.76	0.79	0.79
Portfolio vs. Initial Portfolio							
Tracking Error	–	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Excess Return	–	0.9%	0.8%	1.1%	0.8%	0.3%	0.4%
Information Ratio	–	0.30	0.28	0.35	0.28	0.11	0.12

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Expected returns are shown for asset classes without consideration of fees and expenses.

> Our framework allows us to adjust asset allocation and incorporate ESG preferences in a consistent manner.

Optimization Results

Figure 4 above summarizes the optimization results of asset allocation across a range of different environmental risk tolerance levels. Starting from Portfolio 6 – the portfolio with no consideration given to environmental risk and which hence has the highest environmental risk score, a standard mean-variance optimizer would assign a significant overweight to Emerging Markets Bonds and Global High Yield Bonds. The reasons behind this are two-fold: 1) The two asset classes have attractive risk-adjusted returns base on our 5-year CMAs; 2) These two credit asset classes have high correlations to equity assets and thus act as equity substitutes in the optimized portfolio.

As we decrease our tolerance for environmental risk moving toward the left-hand side of Figure 4, we observe reallocations from higher environmental risk assets, such as Emerging Markets Bond and Global High Yield Bond, to lower environmental risk assets like European and Japanese Equities. Interestingly, the allocation to U.S. Equity exposure, which has higher environmental risk than its developed market peers, starts to increase as we further reduce environmental risk tolerance. This is likely due to the optimizer's attempt to use U.S. equity exposure to substitute for Emerging Markets Bond allocation to lower the overall environmental risk of the portfolio. The impact on the risk and return, however, does not follow a linear pattern.

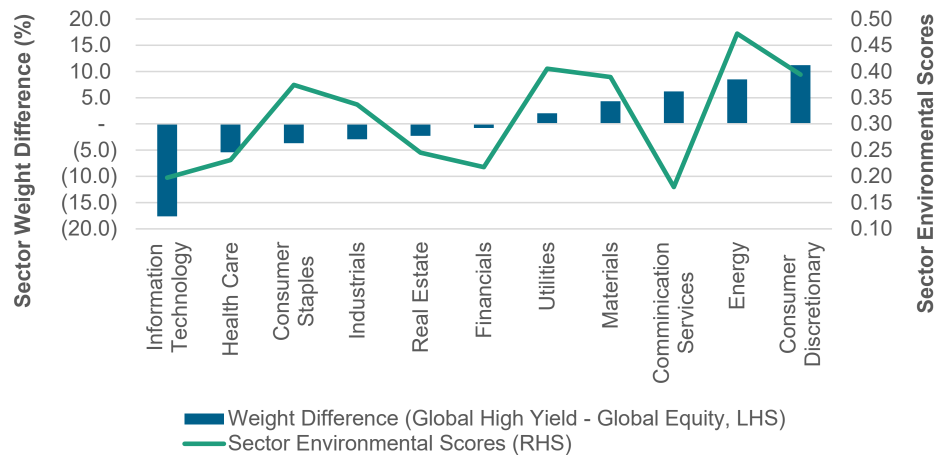
It turns out that this can be explained by their sector exposure differences to a large extent. As shown in Figure 5, compared to Global Equity, Global High Yield tends to overweight sectors with higher environmental risks, such as Consumer Discretionary and Energy, while underweighting sectors such as Information Technology and Health Care, which tend to be associated with lower environment risks.

Conclusion

In this simple illustrative exercise, we developed a framework to help investors adjust asset allocation and incorporate their ESG preferences in a consistent manner.

A Comparison Between Global High Yield and Global Equity

(Fig. 5)



As of June 30, 2023.
Source: ICE BofA, MSCI, Bloomberg Finance L.P. Analysis by T. Rowe Price. See Additional Disclosures for sourcing information.
Sector Environmental Scores are based on RIIM Model.
See Appendix for a representative list of indexes.

Appendix

T. Rowe Price Capital Market Assumptions:

The information presented herein is shown for illustrative, informational purposes only. Forecasts are based on subjective estimates about market environments that may never occur. This material does not reflect the actual returns of any portfolio/ strategy and is not indicative of future results. The historical returns used as a basis for this analysis are based on information gathered by T. Rowe Price and from third party sources and have not been independently verified. The asset classes referenced in our capital market assumptions are represented by broad-based indices, which have been selected because they are well known and are easily recognizable by investors. Indices have limitations due to materially different characteristics from an actual investment portfolio in terms of security holdings, sector weightings, volatility, and asset allocation. Therefore, returns and volatility of a portfolio may differ from those of the index. Management fees, transaction costs, taxes, and potential expenses are not considered and would reduce returns. Expected returns for each asset class can be conditional on economic scenarios; in the event a particular scenario comes to pass, actual returns could be significantly higher or lower than forecast.

Key Risks

Forecasts are based on subjective estimates about market environments that may never occur. Some of the factors that could impact these forecasts include, but are not limited to:

Political and economic conditions

Performance of financial markets

Interest rate levels

Changes to laws or regulations

Investments in equities are subject to the volatility inherent in equity investing, and their value may fluctuate more than investing in income-oriented securities. Certain asset classes are subject to sector concentration risk and are more susceptible to developments affecting those sectors than broader classes. Transactions in securities denominated in foreign currencies are subject to fluctuations in exchange rates, which may affect the value of an investment. Debt securities could suffer an adverse change in financial condition due to a ratings downgrade or default, which may affect the value of an investment. Investments in high yield involve a higher element of risk. Investments in less developed regions can be more volatile than other, more developed markets due to changes in market, political, and economic conditions. Investments are less liquid than those that trade on more established markets.

List of Representative Indices for Each Asset Class

The following indices represented each asset class in the empirical analysis in this paper:

U.S. Equity: S&P 500 Index

European Equity: MSCI Europe Index

Japanese Equity: MSCI Japan Index

EM Equity: MSCI Emerging Markets Index

Global Aggregate Bond (Hedged): Bloomberg Global Aggregate Bond Index USD Hedged

Global High Yield: ICE BofA Global High Yield Index

EM Bond: J.P. Morgan CEMBI Broad Diversified Composite Index

Global Equity: MSCI All Country World Index

Please note this study differs from the CMA in that it employs the S&P500 index in place of the Russell US Large Cap index to represent US equity and the ICE BofA Global HY Index in place of the Bloomberg Corp HY index to represent global high yield bonds.

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