



# Including ESG Preferences in Asset Allocation

A systematic portfolio construction framework to reflect  
ESG considerations.

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## EXECUTIVE SUMMARY

Considering environmental, social and governance (ESG) factors in portfolio construction has become increasingly important as more investors include these as part of their investment objectives.<sup>1</sup> With this in mind, we have developed an intuitive and transparent framework to analyse the ESG characteristics of portfolios and evolve their asset allocation and portfolio construction by explicitly and systematically embedding each investor's ESG preferences. To do so, we consider not only the return and investment risk (e.g., volatility, downside risk) parameters of each investment, but also the ESG risk score.

Our framework can help investors with three main activities:

1. Analyse and calculate a portfolio's ESG risk scores,<sup>2</sup> alongside traditional return and investment risk parameters. This could facilitate informed discussions and, potentially, changes to the asset allocation while considering ESG criteria.
2. Add new investments to existing portfolios while considering ESG factors.
3. Design a new asset allocation that reflects the investor's preferences with respect to asset classes' ESG scores within a risk-aware framework.



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<sup>1</sup> Incorporating ESG factors in asset allocation may lead to suboptimal portfolios from a theoretical investment perspective. Therefore, adjusting portfolios for ESG criteria may not be appropriate for all investors, particularly for those who focus exclusively on investment outcomes and disregard ESG considerations.

<sup>2</sup> ESG risk scores can be based on scores from T. Rowe Price's Responsible Investing Indicator Model (RIIM), the investor's proprietary views, and/or on third-party ratings.

## An Intuitive, Systematic and Flexible Framework

Considering ESG criteria in portfolio construction becomes necessary when such criteria are part of a portfolio's investment objectives. We have developed a framework to reflect each investor's ESG preferences in asset allocation and portfolio construction. We published the framework in our paper *Adjusting Asset Allocation for ESG Preferences* in September 2022<sup>3</sup> (available upon request).

In a nutshell, our framework considers the expected return and investment risk (using measures such as volatility or downside risk) when constructing a portfolio alongside a second risk parameter for each investment: its ESG risk score. It allows investors to analyse and calculate the return, investment risk, and ESG risk of portfolios, as well as to optimise portfolios on these three dimensions. The optimisation considers investment risk based on the risk tolerance and objectives of the investor and ESG risk based on the ESG preference parameter of the investor.

Our framework follows four stages.



### 1. Gather Data

We collect the relevant investment and ESG data for the investments in the universe. For investment data, we can use any set of capital market assumptions (CMAs) or extract CMAs from an existing portfolio using reverse optimisation (extracting the CMAs that would lead an optimiser to the existing asset allocation). For ESG data, we use ESG risk scores for each investment, provided by the investor, a third party, or by using our proprietary model.



### 2. Adjust Utility

We adjust the expected utility of investments based on both their investment and ESG data. Utility is a function of the expected return—the benefit gained from the investment—less investment risk (e.g., volatility, downside risk) and less the ESG risk of each investment—the two sets of risk criteria of the investment.



### 3. Optimise Allocation

Using a utility maximisation process (similar to traditional mean-variance optimisation), we optimise the portfolio using the ESG-adjusted expected utility of the investments.



### 4. Assess Portfolio

By generating a range of optimised portfolios with different sensitivities to investment and ESG criteria, our process can formulate an informed view of the portfolio construction choices. This can guide investors to arrive to a portfolio that best addresses both their investment and ESG objectives and the potential trade-offs between the two sets of goals.

In this paper, we demonstrate three ways investors can use our framework, illustrated by practical examples:

**i) Re-optimising a portfolio considering the ESG risk scores of investments:** Calculate and analyse the portfolio's ESG risk scores alongside traditional return and investment risk parameters. This facilitates informed discussions and, potentially, changes to the asset allocation by now considering ESG factors.

**ii) Adding an investment:** Add new investments to existing portfolios while considering ESG factors.

**iii) Designing a new asset allocation:** Design a new asset allocation that reflects the investor's preferences with respect to asset classes' ESG risk scores within a risk-aware framework.

To set the risk score of each asset class in each example, we aggregate the scores of individual securities within an index representing each asset class from our proprietary Responsible Investing Indicator Model (RIIM). The model systematically and proactively screens the responsible investing (RI) profile of investments, flagging any elevated RI risks and identifying investments with positive RI characteristics.

RIIM has an impressive coverage of the global equity market; for example, with ESG scores for 99.8% of the constituents of the MSCI All Country World Index (ACWI). Our RI research platform also adopts a consistent framework when assigning RIIM scores, enabling us to compare the responsible investment profiles across asset classes and regions.

The ESG risk should be viewed in a similar way to investment risk. Lower ESG risk means the investment scores better on measures of responsible investing, while higher ESG risk means the investment is less positively rated from a responsible investment perspective. The ESG risk scores of each asset class used in this paper range between 0.0 (no ESG risk) and 1.0 (highest ESG risk). The ESG risk scores could be assigned to each asset class through a subjective process, based on the beliefs of the investor. Alternatively, an objective process could be used, for example, by aggregating the risk scores of the constituent securities included in the index representing the asset class—as we do in this paper—or the strategies used in the portfolio.

As we aggregate the ESG risk scores of a large number of individual securities using this method, the overall risk scores at an asset class level tend to not exhibit very large differences in the examples shown. For more concentrated portfolios, or where more targeted exposures such as sector strategies are being considered, these differences are likely to be larger in practice.

<sup>3</sup> The paper explains the various stages of the process and its practical application in granular detail and includes case studies covering a range of different asset allocation, ESG preference, and market volatility scenarios.

## i) Re-optimising a portfolio considering the ESG risk scores of investments

In the first example, we take a typical illustrative portfolio invested across global developed and emerging market equity, investment grade (IG) fixed income, and high yield and emerging market debt. When the portfolio was designed, no ESG criteria were considered. Now, we want to re-optimize the asset allocation while considering the ESG risk of each asset class.

Table 1 includes the asset classes, the benchmarks representing them, their current allocation, their expected return and volatility and their ESG risk scores. The expected return and volatility, as well as correlations needed to calculate the covariance matrix, are based on forward-looking CMAs. We produce five-year CMAs on an annual basis<sup>4</sup> across five major currencies—USD, EUR, GBP, JPY, and AUD. However, the inputs are flexible, so investors can use any CMAs and ESG risk scores.

In Table 2, we use our framework to suggest different optimized asset allocations based on the sensitivity of the investor to the ESG risk of asset classes as reflected by the investor's ESG preference parameter. The higher the parameter, the more sensitive the investor is to ESG risk, leading to lower allocations to assets with higher ESG risk.

The framework allows us to analyse the return, investment risk and ESG risk of the portfolio and different allocations. This facilitates an informed discussion about return and the two dimensions of risk: investment risk and ESG risk. The investor can easily observe the impact of the choices with respect of ESG risk on return and investment risk, both in absolute terms (volatility) and relative to the starting point (tracking error).

As the ESG preference parameter increases, the optimizer gives more weight to the asset classes with lower ESG scores, allocating more to “greener” assets. Because the greener asset classes are generally less volatile in our example, this approach results in a modest reduction in volatility, as well as in expected return, keeping the Sharpe ratio broadly constant.

## Illustrative Portfolio

(Table 1)

Asset Class	Index	Current Allocation (%)	Expected Return (%)	Expected Volatility (%)	ESG Risk Score
Developed Market Equity	MSCI World	44.0	9.2	15.6	0.42
Emerging Market Equity	MSCI Emerging Markets	6.0	9.9	19.4	0.45
Global Fixed Income	Bloomberg Global Aggregate	40.0	4.6	3.7	0.39
Global High Yield	Bloomberg Global High Yield	5.0	7.5	11.3	0.44
Emerging Market Debt	JPM EMBI Global Diversified	5.0	8.1	10.3	0.55
<b>Total Portfolio</b>		<b>100</b>	<b>7.3</b>	<b>8.8</b>	<b>0.42</b>

### Forecasts do not guarantee future results.

For illustrative purposes only.

Returns and volatilities are annualised (e.g., average return per year) and measured in euro.

Source: T. Rowe Price.

<sup>4</sup> Capital Market Assumptions Five-Year Perspective 2023, T. Rowe Price.

## Re-optimised Portfolios

(Table 2)

Asset Class	Allocation (%)					
	ESG Preference 0	ESG Preference 1	ESG Preference 2	ESG Preference 3	ESG Preference 4	ESG Preference 5
Developed Market Equity	44.0	44.5	45.1	45.5	45.8	46.2
Emerging Market Equity	6.0	5.5	4.9	4.5	4.2	3.8
Global Fixed Income	40.0	40.5	41.2	42.2	42.9	43.8
Global High Yield	5.0	4.9	4.6	4.0	3.8	3.3
Emerging Market Debt	5.0	4.6	4.2	3.8	3.3	2.9
<b>Return (%)</b>	7.3	7.2	7.2	7.2	7.2	7.1
<b>Volatility (%)</b>	8.8	8.8	8.7	8.6	8.6	8.5
<b>ESG Risk Score</b>	0.418	0.417	0.416	0.415	0.414	0.413
<b>Tracking Error (%)</b>	-	0.1	0.2	0.3	0.4	0.5
<b>Sharpe Ratio</b>	0.60	0.60	0.60	0.60	0.60	0.60
<b>Equity Weight (%)</b>	50.0	50.0	50.0	50.0	50.0	50.0
<b>Fixed Income Weight (%)</b>	50.0	50.0	50.0	50.0	50.0	50.0

### Forecasts do not guarantee future results.

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Returns and volatilities are annualised (e.g., average return per year) and measured in euro. Tracking error is versus current allocation.

Source: T. Rowe Price.

### ii) Adding an investment

In the second example, we take the illustrative portfolio we used in the first example and this time look to add a new asset class: commodities. On one hand, commodities are an asset class that could keep up with inflation over time and provide potential diversification benefits. Commodities can exhibit negative correlation with equity markets at certain times of stress. One example is the 2022 outbreak of war in Ukraine that sent equity markets downward and energy and commodity prices upward.

Last year (2022) was a challenging year for multi-asset investors. Global equities returned -12.8% and global investment grade (IG) bonds returned -13.3%. However, commodities rallied by 20.9% during the year. The strong performance was partially due to the impact of the war in Ukraine on energy and commodity prices. Commodities have a positive but imperfect correlation (0.40) with global equity and negative correlation (-0.15) with global IG bonds.<sup>5</sup> As a result, commodities would be added to the illustrative portfolio with a relatively small allocation of 1.5% if ESG preferences are not considered.

On the other hand, commodities investment comes with relatively high ESG risk because of its exposure to fossil fuels and the resulting negative impact on the environment. For this reason, we assign commodities an arbitrary ESG risk score of 0.80 for illustrative purposes. The expected return of commodities is 4.7% per annum and expected volatility is 18.2%, based on our CMAs. To simulate commodities, we use the Bloomberg Commodity Index.

Table 3 shows the output of our framework, suggesting different optimised asset allocations based on the investor's ESG preference parameter. By increasing the ESG preference, the optimiser reduces the allocation to commodities.

Our framework allows investors to quantify the trade-off between adding an asset with diversification benefits and increasing ESG risk. As we show here, often, trade-offs are not binary, black-and-white choices but rather shades of grey involving a choice on a spectrum. Adding commodities makes little difference to the expected risk-adjusted return as measured by the Sharpe ratio, while increasing the ESG risk score at the overall portfolio level.

<sup>5</sup> Past performance is not a reliable indicator of future performance. Global equity is represented by MSCI ACWI measured in euro. Global investment-grade bonds are represented by Bloomberg Global Aggregate Index hedged to euro. Commodities are represented by Bloomberg Commodity Index measured in euro. Correlations are based on monthly total returns measured in euro of the indices over the period August 2012 through December 2022.

## Re-optimised Portfolios

(Table 3)

Asset Class	Current Allocation (%)	ESG Preference						
		0	1	2	3	4	5	6
Developed Market Equity	44.0	43.0	43.4	43.8	44.3	44.7	45.0	45.3
Emerging Market Equity	6.0	6.0	5.9	5.8	5.7	5.6	5.5	5.4
Global Fixed Income	40.0	39.5	39.6	39.8	40.1	40.4	40.8	41.1
Global High Yield	5.0	5.0	4.9	4.9	4.8	4.7	4.6	4.5
Emerging Market Debt	5.0	5.0	4.8	4.7	4.4	4.2	4.0	3.8
Commodities	–	1.5	1.3	1.1	0.8	0.5	0.2	–
<b>Return (%)</b>	7.3	7.2	7.2	7.2	7.2	7.2	7.2	7.2
<b>Volatility (%)</b>	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8
<b>ESG Risk Score</b>	0.418	0.424	0.423	0.422	0.420	0.419	0.417	0.416
<b>Tracking Error (%)</b>	–	0.2	0.2	0.1	0.1	0.1	0.1	0.2
<b>Sharpe Ratio</b>	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
<b>Equity Weight (%)</b>	50.0	49.0	49.3	49.6	50.0	50.3	50.5	50.7
<b>Fixed Income Weight (%)</b>	50.0	49.5	49.4	49.3	49.3	49.3	49.3	49.4
<b>Commodities Weight (%)</b>	–	1.5	1.3	1.1	0.8	0.5	0.2	–

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For illustrative purposes only.

Returns and volatilities are annualised (e.g., average return per year) and measured in euro. Tracking error is versus current allocation.

Source: T. Rowe Price.

### iii) Designing a new asset allocation

In our final example, we design a new strategic asset allocation (SAA). In the first instance, we consider only investment criteria spanning expected return, volatility and correlations. Then, we add the ESG risk scores of investments alongside the CMAs.

Table 4 lists the asset classes that we consider in this example. We opt for a more granular approach than in the previous two examples so the portfolios resemble more closely portfolios that Europe-based investors may seek to construct.

In Table 5, we show the results of a mean-variance optimisation (MVO) targeting a portfolio with an SAA of about 60% equity and 40% fixed income without considering the ESG risk scores of assets. We then optimise the portfolio twice again, with mild and strong ESG preference parameters.

Despite their more attractive ESG risk score, euro government bonds do not receive an outsized allocation, even under strong ESG preferences, because of their relatively low Sharpe ratio. Among fixed income assets, the optimiser prefers global IG corporates because of their better balance between Sharpe ratio—investment characteristics—and ESG characteristics.

## Asset Class Universe and Respective Capital Market Assumptions

(Table 4)

Asset Class	Index	Expected Return (%)	Expected Volatility (%)	ESG Risk Score	Sharpe Ratio
US Equity	Russell 3000	8.7	15.9	0.42	0.42
European Equity	MSCI Europe	10.3	16.6	0.38	0.50
Japanese Equity	MSCI Japan	9.2	16.1	0.40	0.45
Emerging Market Equity	MSCI Emerging Markets	9.9	19.4	0.45	0.41
Global IG Corporates	Bloomberg Global Aggregate Corporate	6.2	5.7	0.40	0.74
Global High Yield	Bloomberg Global High Yield	7.5	11.3	0.44	0.49
Euro Government Bonds	Bloomberg Euro Government	2.9	4.9	0.33	0.18
Emerging Market Debt	JPM EMBI Global Diversified	8.1	10.3	0.55	0.59
Euro Cash		2.0	0.8	-	-

**Forecasts do not guarantee future results.**

For illustrative purposes only.

Returns and volatilities are measured in euro. IG = investment grade.

Source: T. Rowe Price.

## Asset Class Universe and Respective Capital Market Assumptions

(Table 5)

Asset Class	Allocation (%)		
	60/40 MVO	60/40 Mild ESG Preferences	60/40 Strong ESG Preferences
US Equity	34.2	33.3	32.3
European Equity	15.5	16.1	16.8
Japanese Equity	4.2	4.3	4.4
Emerging Market Equity	6.3	6.1	6.0
Global IG Corporates	11.2	12.9	14.9
Global High Yield	5.1	4.3	3.6
Euro Government Bonds	17.7	18.1	18.2
Emerging Market Debt	5.8	4.9	3.9
<b>Return (%)</b>	7.9	7.7	7.6
<b>Volatility (%)</b>	10.4	10.2	10.1
<b>ESG Risk Score</b>	0.406	0.404	0.401
<b>Tracking Error (%)</b>	-	0.2	0.3
<b>Sharpe Ratio</b>	0.57	0.56	0.55
<b>Equity Weight (%)</b>	60.2	59.8	59.5
<b>Fixed Income Weight (%)</b>	39.8	40.2	40.5

**Forecasts do not guarantee future results.**

For illustrative purposes only.

Returns and volatilities are annualised (e.g., average return per year) and measured in euro. Tracking error is versus 60/40 MVO. IG = investment grade.

Source: T. Rowe Price.

## Conclusion

Investors often need to strike a balance between dual objectives: maximising risk-adjusted expected return and considering the ESG characteristics of their portfolios. These two objectives lie on a spectrum and often involve a potential trade-off because considering ESG factors may constrain the investment universe and in turn alter the investment characteristics of portfolios.

Our framework offers a way to achieve an informed balance between the two sets of criteria. It allows investors to quantify the result of leaning toward investment criteria or ESG criteria and provides the basis to add new investments to portfolios or design new portfolios while considering both investment and ESG preferences.

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