A Guide to ESG Portfolio Construction

Michael Branch, CFA
Lisa Goldberg, PhD
Pete Hand

- We explore six quantitative environmental (E), social (S), and governance (G) strategies that can align investors' portfolios with their ethical and financial views.
- These strategies offer different approaches to the trade-off between excess risk and undesired ESG attributes.
- We conclude that fully understanding the dynamics of these trade-offs allows investors to best select the strategy that matches their motivations and preferences.

Environmental (E), social (S), and governance (G) strategies appeal to a broad group of investors, ranging from social activists to alpha seekers. Growing demand for ESG strategies has led to a proliferation in offerings, with providers emphasizing cleaner air and water, greater diversity, healthier diets, more sustainable energy, and of course, market outperformance. The last point is sometimes referred as "doing well by doing good." Critics of ESG investing argue that this is impossible, since the reduction in the financial opportunity set imposed by ESG considerations necessarily leads to lower returns or greater risks. ESG enthusiasts, security analysts, and asset managers typically respond with historical simulations of their favorite strategies showing good results. The usual opacity of financial products is further clouded by the emotional and ethical considerations related to ESG.

Any discussion of ESG alpha depends on a clear understanding of an investor's goals and constraints, and we obtain that through a detailed social conversation. Also essential is a set of best practices for ESG portfolio construction, which is the subject of this note. We show how to customize ESG portfolios to investors' goals using examples based on industry exclusion and gender diversity, and we highlight the trade-off between risk control and unintended exposures that may emerge in the portfolio construction process.[1]

Investor Goals and ESG

The structure of an ESG portfolio depends on the investor's goals. To see why, consider a political consultant who expects legislators to hold Big Soda accountable for growing health care costs related to obesity and type 2 diabetes. Because she anticipates a tax on soft drink producers, and because she believes the market is not paying attention, she excludes Big Soda from her portfolio and weights the remaining securities by capitalization. She holds an active portfolio designed to outperform the index when the market prices the impact of the soda tax. A second investor interested in excluding Big Soda is a nurse who works with overweight children in a clinic on the South Side of Chicago. He believes soft drink producers are responsible for the pain and suffering he sees every day, and he believes the government will not do anything to help. With these ethical considerations in mind, he instructs his financial advisor to exclude soft drink producers from his portfolio. The advisor, in turn, instructs her public equity manager to sell the unwanted companies and then reweights the remaining securities to minimize tracking error relative to an index. This portfolio is designed to deliver benchmark-like returns.

Both portfolios exclude soft drink producers, although the political consultant holds a relatively aggressive active portfolio, while the nurse holds an index-tracking portfolio that he wants to align with his social values.

Scored data allows ESG investors to develop strategies that go beyond exclusion. Investors seeking a lower carbon footprint can use data from MSCI or other vendors to tilt their portfolios toward firms with lower emissions per dollar in revenue. Investors who believe that more diverse companies generate better returns can tilt their portfolios toward firms with

[1] Tax considerations and other important factors are ignored in the simplified setting regarded in this note.

more women than average on their boards, since Bloomberg, Institutional Shareholder Services–IW Financial, and other vendors provide the required information. If investors choose to avoid firms with no women on their boards, they can also exclude them before implementing the tilt.

The past 40 years have taught us just how hard it is to outperform the market or to affect social change through investing. Still, investors strive to structure their portfolios with these goals in mind. In the discussion below, we explain options for how to align an investor's portfolio with social and financial goals in practice.[2]

Examples of ESG Portfolio Construction

We outline six ESG portfolio implementations, or perhaps more accurately, three pairs of ESG portfolio implementations. The first two strategies are the simplest and most familiar. They rely on binary (in or out) data to exclude unwanted securities. The second pair relies on scored data. Scored ESG strategies are more nuanced than exclusions, but they may not satisfy investors who are strict about excluding securities. The third pair combines exclusion and scoring, leading to the most complex implementations. Each pair highlights a commonly encountered trade-off between higher-than-necessary risk and unwanted exposure. The trade-off results from correlation: excluding or underweighting unwanted securities in combination with risk minimization leads to overweights in securities that are correlated with the rejects. We will see this repeatedly in the examples below.

The most basic ESG strategy is **Cap-Weighted Exclusion**, which omits unwanted securities from a diversified benchmark and then weights remaining securities in proportion to their market capitalizations.[3] This is an active bet despite the fact that the exclusion is cap-weighted.[4] It can make sense for an alpha-seeking investor who believes the excluded securities will underperform or for a socially motivated investor who decides not to hold certain securities on ethical grounds. This strategy generally outperforms its benchmark when the excluded securities underperform. But it carries excessive tracking error (i.e., higher variability of returns versus the benchmark) since the residual risk introduced from the exclusions is not controlled or managed anywhere in the investment process.

An **Optimized Exclusion** strategy also begins by omitting unwanted securities, but it differs from Cap-Weighted Exclusion by weighting remaining securities in order to minimize tracking error. In many cases, tracking error in an Optimized Exclusion is so low that the portfolio will tend to deliver benchmark-like returns.[5] However, the mechanism for lowering

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[2] Alpha-seeking ESG investors may also be interested in performance attribution, which we will discuss in a separate document.

[3] An exclusion can be a single security or a large fraction of the parent index. A collection of excluded securities may or may not be well aligned with a few risk factors, with different consequences for portfolio construction.

[4] The weight of a security in a Cap-Weighted Exclusion will generally not match the weight in the parent index. For example, the Cap-Weighted Exclusions in this article have large-cap biases.

[5] Patrick Geddes. "Mitigating the Unnecessary Risk of Specialized Indexes." Aperio White Paper, 2016.
Patrick Geddes, Lisa Goldberg, Robert Tymoczko, Michael Branch. "Building a Carbon-Free Equity Portfolio." Aperio White Paper, 2016.

tracking error overweights securities that are correlated with the omitted securities, and that can produce unwanted or unintuitive outcomes as illustrated in the following examples.

At Aperio, one of the most frequent ESG requests we receive from clients is to exclude the Oil, Gas & Consumable Fuels (OGCF) industry from a diversified benchmark. Table 1 shows the trade-offs between Cap-Weighted Exclusion and Optimized Exclusion of this industry from the S&P 500. On March 30, 2018, the tracking error of a Cap-Weighted Exclusion was almost double the tracking error of an Optimized Exclusion. But the latter had substantial overweights in correlated industries. For alpha-seeking investors, an incomplete specification of an Optimized Exclusion approach may dilute or weaken the performance impact of screening, even if the market moves in the direction of their beliefs. For a socially motivated investor, an incomplete specification may lead to a portfolio that does not incorporate her concerns.

		Active Weight				
	Tracking Error	Oil, Gas & Consumable Fuels	Energy Equipment & Services	Utilities	Materials	Industrials
Cap-Weighted Exclusion (OGCF)	0.84%	-4.95%	0.04%	0.15%	0.15%	0.53%
Optimized Exclusion (OGCF)	0.44%	-4.95%	2.24%	1.36%	0.77%	0.20%

Table 1: *Oil, Gas & Consumable Fuels (OGCF) exclusion portfolios. March 30, 2018. Benchmark: S&P 500. Sources: Aperio Group, LLC, and MSCI.*

We further explore the trade-off between Cap-Weighted Exclusion and Optimized Exclusion by changing the focus to the Soft Drink Sub-Industry. Here, we see a *cascade effect*: a nested sequence of Optimized Exclusions, where risk minimization added to the weight of potentially objectionable securities at each step.

A Cap-Weighted Exclusion of the Soft Drink Sub-Industry had a tracking error of 0.21% against the S&P 500. Optimization lowered the tracking error to 0.17% and, as expected, overweighted a correlated industry. In this case, the overweights included Tobacco, another "hot button" industry that may trigger financial or ethical concerns. We took the obvious next step of constructing an Optimized Exclusion of both Soft Drinks and Tobacco, which both raised tracking error and overweighted industries involving alcohol, Distillers & Vintners and Brewers. Some investors may be satisfied with this portfolio, while others may want to continue on the same path. Adding alcohol-related industries to the list of exclusions again raised tracking error and overweighted Packaged Foods & Meats. The details of the cascade are summarized in Table 2.

			Active Weight				
		Tracking Error	Soft Drinks	Tobacco	Distillers & Vintners	Brewers	Packaged Foods & Meats
Exclusion	Cap-Weighted (S)	0.21%	–1.63%	0.02%	0.00%	0.00%	0.02%
	Optimized (S)	0.17%	–1.63%	0.50%	0.28%	0.15%	0.30%
	Optimized (S, T)	0.23%	–1.63%	–1.21%	0.71%	0.33%	0.53%
	Optimized (S, T, A)	0.27%	–1.63%	–1.21%	–0.24%	–0.06%	0.84%
	Optimized (S, T, A, P)	0.31%	–1.63%	–1.21%	–0.24%	–0.06%	–1.12%

Key: S=Soft Drinks; T=Tobacco; A=Alcohol; P=Packaged Foods

Table 2: *The soft drink cascade. March 30, 2018. Benchmark: S&P 500. Sources: Aperio Group, LLC, and MSCI.*

More refined portfolios can be constructed with scored ESG data, which has become available in response to investor demand for information about public companies' attributes and as a consequence of disclosure requirements from governments and regulatory entities. Company-specific data on a wide variety of social criteria, ranging from environmental compliance to boardroom diversity and executive pay, is now available. Since companies are now scored by selected ESG characteristics, a portfolio can be constructed to overweight or underweight individual securities that match a particular social orientation in an *optimized tilt*. This construction balances the competing priorities of increasing a portfolio's ESG score and decreasing the portfolio's tracking error relative to its benchmark, allowing an investor to modulate the influence of ESG. In effect, ESG indicators have been added to traditional financial measures, taxes, and other fundamental information that investors and managers use to evaluate the merits of public companies.[6] As in the previous examples, an optimized portfolio may appeal either to an alpha-seeking investor who expects outperformance or to a socially motivated investor who wants to align his portfolio with his personal views.

We constructed two optimized tilts for a gender diversity strategy based on the MSCI ACWI. Both tilts made use of scored data, the number of women on a firm's board, and both optimized tilts referenced the Optimized Exclusion (Table 3, row 1B), which was the minimum tracking error portfolio that excluded firms with no women on their boards. That Optimized Exclusion had a tracking error of 0.35%, and the weighted-average number of women on board was 2.64. The **Maximum Score** tilt (Table 3, row 2A) achieved the largest possible weighted-average number of women on board, 3.20, for the level of tracking error, 0.35%, of the Optimized Exclusion. The **Minimum Risk** tilt (Table 3, row 2B) achieved the lowest possible tracking error, 0.27%, while matching the weighted-average number, 2.64, of women on board in the Optimized Exclusion. Both optimized tilts, however, included some firms with no women on their boards, unlike the Cap-Weighted Exclusion and Optimized Exclusion shown in the top two rows of Table 3. This may trouble some investors, and it led us to combine exclusions and tilts.

[6] This will also be the subject of a forthcoming Aperio blog post on the state of ESG data as a fundamental factor in evaluating companies.

Continuing with gender diversity, we constructed two portfolios that build on the Cap-Weighted Exclusion (Table 3, row 1A). In a **Customized Tilt Exclusion** (Table 3, Row 3A), we treated the Cap-Weighted Exclusion as a custom benchmark and minimized tracking error against it, subject to a target ESG score. A **Tilt Exclusion** (Table 3, Row 3B) was constructed in the same way, except that tracking error was minimized relative to the diversified benchmark and not to the Cap-Weighted Exclusion. Both portfolios were free of firms with no women on their boards. However, there is a difference between them. As in the previous examples, this pair of portfolios exhibited a trade-off between exposure and risk. The tracking error of the Customized Tilt Exclusion was 0.37 percentage points higher than the tracking error of the Tilt Exclusion. The extra risk of the Customized Tilt Exclusion was rewarded with a lower weight of companies with no female executives. This effect was achieved through correlation: firms with no women on their boards are more likely than average to have no female executives.

	Strategy	Tracking Error	Weight (%) of 0 Women on Board	Weighted-Average No. of Women on Board	Weight (%) of 0 Female Executives	Weighted-Average No. of Female Executives
1A	Cap-Weighted Exclusion	0.75%	0.0%	2.78	22.3%	1.60
1B	Optimized Exclusion	0.35%	0.0%	2.64	24.6%	1.58
2A	Maximum Score	0.35%	4.6%	3.20	20.7%	1.98
2B	Minimum Risk	0.27%	9.0%	2.64	26.5%	1.83
3A	Custom Tilt Exclusion	0.77%	0.0%	3.19	19.8%	1.74
3B	Tilt Exclusion	0.40%	0.0%	3.20	21.3%	1.74

Table 3: *Six gender diversity portfolios constructed by excluding firms with no women on their boards or tilting toward firms with a higher-than-average number of women on their boards. March 30, 2018. Benchmark: MSCI ACWI. Sources: Aperio Group, LLC, and MSCI.*

From Motivation to Strategy

The motivation for an ESG investment may depend on ethical considerations, such as social activism and peace of mind, and financial considerations, such as index tracking or alpha generation. This diverse set of incentives leads to a specific set of technical specifications that facilitate portfolio construction. The appropriate technical specification depends on a number of factors. These include the quality of the relevant ESG data, as well as the investor's level of risk aversion and degree of comfort with securities that are correlated with specified exclusions and underweights.

In any portfolio, unwanted exposures or underperformance relative to a benchmark are possible; however, the growing library of ESG data and the sophistication of portfolio construction techniques increasingly allow investors to hold the portfolios that best match their ethical and financial views.

Technical Goal	Data Granularity	Risk Aversion	Strategy	Trade-Off
Exclude Unwanted Securities	Binary	Low	Cap-Weighted Exclusion	Excess Tracking Error
		High	Optimized Exclusion	Risk of Unwanted Exposure
Tilt on a Theme	Scored	Low	Maximum Score	Excess Tracking Error
		High	Minimum Risk	Risk of Unwanted Exposure
Exclude and Tilt	Binary and Scored	Low	Custom Tilt Exclusion	Excess Tracking Error
		High	Tilt Exclusion	Risk of Unwanted Exposure

Table 4: *Summary of ESG strategies.*

Disclosures

The information contained within this paper was carefully compiled from sources Aperio believes to be reliable, but we cannot guarantee accuracy. We provide this information with the understanding that we are not engaged in rendering legal, accounting, or tax services. In particular, none of the examples should be considered advice tailored to the needs of any specific investor. We recommend that all investors seek out the services of competent professionals in any of the aforementioned areas.

With respect to the description of any investment strategies, simulations, or investment recommendations, we cannot provide any assurances that they will perform as expected and as described in our materials. Past performance is not indicative of future results. Every investment program has the potential for loss as well as gain.

The S&P 500® is an equity benchmark for US stock performance. It is a capitalization-weighted index covering 500 large US companies chosen by Standard & Poor's for market size, liquidity, and industry group representation.

The MSCI ACWI is an equity benchmark for global stock performance. It is a capitalization-weighted index covering large and midsize companies. The index includes approximately 2,800 stocks from 23 developed-market countries and 24 emerging-market countries.