Measuring the Contributions of SRI/ESG Investment Strategies

ESG investments have grown significantly in recent years and the trend is to accelerate. This article proposes a model that makes it possible to attribute the return associated with the integration of ESG constraints into portfolio management. ESG strategies use objective criteria common to all investors, such as sector or industry classification, on the one hand, and criteria based on scores or ratings and acceptance thresholds on the other. For the former, we propose either to attribute performance against standard indices or to use the current ESG indices. For the latter, we have developed a model based on the creation of successive indices, which make it possible to isolate the impact of the integration of ESG constraints into management and to adapt to the different existing ESG strategies. This approach is then complemented by Brinson-type allocation models or specific models for fixed-income portfolios.

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Investments in SRI funds have increased significantly in recent years. Many studies have been conducted to measure the performance of these funds against unconstrained funds. The results, although mixed, suggest that the long-term performance of companies adopting ESG policies is higher. It is therefore important to measure the performance of these SRI funds in relation to their benchmark or index.

When the ESG strategy depends on indisputable criteria such as controversial weapons, it is possible to obtain indices that can serve as a standard benchmark for a large number of investors. On the other hand, when the ESG strategy limits the eligible investment universe based on scores that depend on data providers and a threshold for integration or exclusion of securities, it becomes impossible to obtain indices that can be used for all strategies. It is therefore necessary to develop a methodology that makes it possible to isolate the contribution of these decisions in relation to the indices available on the market.

In this article, we propose a methodology based on the creation of successive benchmarks to isolate the contribution of each step of the ESG investment process. The model we propose in this article applies to all ESG strategies that result in a limited investment universe. We will illustrate the methodology for two popular strategies, the Best-in-Class strategy and the exclusion-based strategy. Once the contributions of these strategies have been measured, we then apply the standard allocation methods using synthetic benchmarks created using the successive benchmark method.

Environmental, Social and Governance ("ESG") factors are increasingly important to investors and asset managers. A large majority of investors are now signatories to the UN Principles for Responsible Investment, which forces asset managers to incorporate ESG principles into the investment processes. Incorporating ESG principles into the investment process limits the universe of investments, which, theoretically means that portfolio construction is sub-optimal, hence risk-adjusted returns of ESG portfolios should be lower than those for unrestricted portfolios. Nevertheless, studies suggest that long-term risk is associated with poor ESG practices are

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not fully integrated in market prices, which means that long-term risk-adjusted returns of ESG funds should be superior to non-ESG funds.

To decide whether a company belongs to the investment universe of ESG funds, asset managers need to assess the company's ESG practices. Unfortunately, in the absence of standards for ranking, asset managers struggle to incorporate ESG criteria into their investment processes. However, ESG ratings, initiated in 1990 by KLD (now MSCI), are becoming more and more popular and standards are emerging, such as the SASB[1] standard, which helps businesses around the world identify, manage and report on the sustainability topics that matter most to their investors.[2]

It is therefore becoming important to propose a method to measure the contribution of ESG strategies to fund performance. Such a method must be easily adapted to the data used to define the limited ESG universe and must naturally be linked to traditional allocation methodologies, whether for equity, bond or diversified portfolios. In this article, we propose a performance attribution model with these characteristics.

The first section describes popular ESG investment processes. In the second section, we propose an attribution methodology that is adapted to ESG strategies that involves limiting the eligible investment universe. We present this methodology through an example based on best-in-class and exclusion strategies. When exclusion strategies apply to categories or sectors, these are allocation decisions. Similarly, strategies that aim to invest in securities that meet ESG criteria (positive screening) are associated with stock-picking. The model we present here measures the contribution of decisions associated with the ESG process. As these decisions have the effect of limiting the eligible investment universe, the model will separately identify decisions that involve a change in allocation from those that lead to stock picking.

SECTION 1 - INVESTMENT PROCESSES

The first step to attribute return is to identify the investment processes. Performance attribution models usually decompose active returns into allocation, selection and interaction, or, for fixed income, into carry, curve and credit effects. Often, currency effect is identified as well as the contribution of currency overlay.

In this article, we will focus on ESG investment strategies that have an impact on the investment universe. Below, we present the different strategies, and their respective impact on the universe.

- Best-in-Class or Positive screening: This strategy is based on the conviction that companies that have integrated ESG criteria are more efficient in the long term. The Best-in-Class strategy consists of selecting the companies best positioned on the ESG criteria, whether in their category, asset class, sector, or any other grouping. This strategy reduces the investment universe.

- Exclusion or Negative screening: The exclusion may concern specific countries, sectors or companies. This strategy has a clear impact on the investment universe. For exclusion criteria for which there is a broad consensus (*e.g.*, the controversial weapons industry), there are indexes that take these exclusions into account..[3]

- Normative screening: this strategy filters companies based on their compliance with international standards. The impact on the eligible universe is real, but it depends on the thresholds of exclusions or inclusions of companies in the universe. It should be noted that these thresholds are defined in relation to scores that can sometimes be very different depending on the data providers. It is therefore very difficult to obtain indices that correspond to this type of strategy.

- ESG integration: Analysts add ESG considerations alongside traditional financial analysis when recommending securities to the asset manager.

- Thematic: the objective is to invest according to specific criteria, such as environmental (E), social (S) or governance (G) criteria. The investment theme can also focus on carbon emissions or any other criteria associated with sustainable investment. Thematic strategies have an impact on the eligible investment universe.

- Impact investing: seeking to deliver positive societal outcomes as a key investment objective.

- Active Ownership: Asset managers are engaging

Table 1: All Scores Have Been Rounded

Criteria	FTSE	MSCI	SUSTAINALYTICS
Environment	0	95	70
Social	5	25	50
Governance	50	55	60
Overall	**20**	**55**	**60**

with companies on ESG issues in order to influence their ESG behavior or improve their disclosure level.

While this is not an exhaustive list of ESG strategies, it reflects probably the most popular ESG investment processes.

As we can see, ESG strategies can be divided into two categories; those that have an impact on the investment universe and those that do not. Strategies that have no impact on the investment universe can be analyzed by standard performance attribution models. For others, those that have an impact on the universe, we must distinguish two types of strategies. Strategies that are based on objective and unambiguous criteria and those that use scores or criteria obtained from data collection and methodologies. The former, such as exclusion strategies in sectors such as controversial weapons, can be compared to standard ESG indices. Indeed, the exclusion criteria is common to all investors and does not depend on their preferences. The second, such as best-in-class strategies, use scores to rank securities and a threshold to define inclusion. The thresholds will then depend on the sensitivity of the portfolio managers, or the asset owners, and it becomes impossible to have standard indices to calculate the attribution effects. In addition, ESG scores are very sensitive to the methodologies of different data providers.

To illustrate this, let us compare the ESG scores given to Tesla by SUSTAINALYTICS, MSCI and FTSE (see Table 1).[4]

Tesla receives the lowest score from FTSE on "Environment" because FTSE assumes the worst when a company doesn't disclose. At the opposite, MSCI assumes that if there is no disclosure, the company operates in line with regional and industry norms. This simple example shows how difficult it may be to include ESG criteria in the investment decision process. Nevertheless, standards are emerging on the market and providers are becoming more and more transparent about methodologies used to calculate ESG scores. As we want to concentrate on how to attribute active return to each step of the investment process, we will assume that ratings or ESG scores are consistent across all providers. This should be the case in the near future. It is also important to note that the method we propose in this article adapts to different ESG criteria, whether it is a thematic approach with a focus on E, S or G, or an approach based on carbon emission criteria. Indeed, the first step of the model assumes the existence of an ESG universe, whatever the criterion used to constitute this universe.

Negative or positive screening does not suffer the same issues as it consists of removing securities that belong to pre-defined sectors or industries. Most often, negative screening applies to industries such as Tobacco, Casinos and Gaming, Coal and Consumable fuels, and others.

In the next section, we will develop an attribution model that isolates the contribution to return associated to ESG constraints.

First, we propose a model for ESG strategies that do not impose any sector-specific exclusions but use scores or ratings within each sector to define the ESG investment universe. Such strategies are, for example, best-in-class, thematic or integration strategies. In this article, we will refer to ESG Issuer Strategy, which include all ESG strategies that use specific firm scores or practices.

Secondly, we will develop a model that incorporates a first step of negative screening (exclusion of certain sectors) and then, within the selected sectors, the selection of securities meeting ESG criteria.

Both models are perfectly compatible with different ESG ratings or scores, and can also be combined naturally with Brinson or other specific models for bond portfolios.

SECTION 2 - ESG ATTRIBUTION MODELS

2.1 MODEL FOR ESG ISSUER STRATEGIES

Performance attribution models aim to quantify the contribution of active management decisions. This means that the starting point for these models is given by a passive portfolio or an index. If we consider that the integration of ESG criteria is an active management decision, it is then normal to build the model from standard indices. Using standard indices has several advantages: first, it quantifies the impact of integrating ESG criteria. Second, it makes it easier to compare with portfolios that do not incorporate these criteria, and third, it reduces the costs associated with collecting data for ESG indices.

For the sake of clarity, we will present all calculations over a single period. To calculate the results over a longer period, one can easily link all effects using standard chaining methodologies, such as Carinõ, Menchero, GRAP and others.

The return of the index is

$$R_B = \sum_{Securities} w_{B,i} \times r_{B,i}$$

The integration of ESG criteria has the effect of reducing the investment universe. The model must therefore quantify the contribution to the active return associated with the ESG constraints placed on the standard index. The method is thus based on the transition from a standard index to an index adjusted for ESG constraints. For this reason, we will refer to the successive benchmarks method.

The active return between the portfolio P and the benchmark B can then be broken down into a first term representing the difference in return between the ESG benchmark and the portfolio, and a second term representing the transition from the standard benchmark B to the ESG benchmark.

$$R_P - R_B = (R_P - R_{ESG}) + (R_{ESG} - R_B) \quad . \quad (1)$$

This first step of integration strategies consists to limiting the universe of investments while keeping allocation constant as well as relative weights for remaining securities.

The eligibility of securities according to ESG criteria will depend on the ESG strategy. Thus, a Best in Class strategy will use a score or rating to rank securities within each sector. Then, either an eligibility threshold or a percentile will be fixed. When the strategy is thematic, the scores or percentiles will apply to one or more criteria E, S, or G. This may also be a criterion associated with carbon emissions. For integration strategies, the choice of securities in the sectors will no longer result solely from a ranking, but will be based on the individual analysis of issuers and the investor's internal score.

It is also interesting to note that sectorial classifications incorporating ESG criteria are developing. For example, the SASB's Sustainable Industry Classification System®, which complements the traditional classification systems by grouping companies into sectors and industries in accordance with a fundamental view of their business model, their resource intensity and sustainability impacts, and their sustainability innovation potential.[5] SICS® groups securities across 11 sectors and 77 industries.

Equation (1) shows that Integration strategies attribution model can be decomposed into two terms. The term $(R_{ESG} - R_B)$ supposes that we have constructed a synthetic ESG benchmark from the initial benchmark. This synthetic ESG benchmark has to be neutral in sectorial allocation and for remaining securities. Let us assume that the benchmark sectorial allocation is given by $W_{B,k}$. Neutral allocation implies that the ESG benchmark sectorial weights $W_{ESG,k}$ are equal to the benchmark weights, $W_{B,k}$. Although weights are equal, the return of sector *k* is different between the benchmark and the synthetic ESG benchmark. The reason is that the synthetic benchmark is a subset of the initial benchmark.

Before calculating the return of the synthetic ESG benchmark, we must define the weights for this synthetic benchmark.

$$W_{ESG,i} = \begin{cases} \dfrac{W_{B,i}}{\sum_{i \in ESG\ Universe} W_{B,i}} \times C_k, & i \text{ included in ESG Universe} \\ 0, & i \text{ excluded in ESG Universe} \end{cases} \quad . \quad (2)$$

Where C_k is a sectorial coefficient to ensure that the sectorial allocation remains equal between the initial benchmark and the ESG benchmark.

$$C_k = \frac{W_{B,k\cdot}}{W_{ESG,k}}$$

We can also write returns for all sectors as follow:

Benchmark return for sector

$$k = \; R_{B,k} = \sum_{i \in k} w_{B,i} \times r_{B,i} \text{ and,}$$

ESG benchmark return for sector

$$k = \; R_{ESG,k} = \sum_{i \in k} w_{ESG,i} \times r_{B,i}$$

Using initial weights and ESG weights, it is then possible to calculate the returns for both the initial and synthetic benchmark. The difference of returns will be defined as the contribution of the ESG Integration strategy, or ESG effect.

$$ESG\ Effect = R_{ESG} - R_B = \sum_{Securities} CR_{B\ to\ ESG,i} \quad . \quad (3)$$

Where the contribution of changing the weights between the initial and the ESG benchmark is given by:

$$CR_{B\ to\ ESG,i} = \left(w_{ESG,i} - w_{B,i}\right) \times r_{B,i} \quad . \quad (4)$$

$w_{ESG,i}$ are given by equation (1) and the returns of the benchmarks are:

$$R_B = \sum_{Securities} w_{B,i} \times r_{B,i}$$

$$R_{ESG} = \sum_{Securities} w_{ESG,i} \times r_{B,i}$$

Example 1 below illustrates the calculation of the ESG effect.

EXAMPLE 1

Let us assume that the initial benchmark has the sectorial allocation illustrated in Table 2 and that the Issuer ESG strategy is a Best-in-Class strategy. The ESG eligible assets within each sector are selected when their ESG score is higher than 70.

Table 3 below gives, for the sector Consumer discretionary, the weights for all securities, the ESG score and the details needed to calculate the new ESG weights. The first step is to identify the subset of ESG eligible securities. In our example, eligibility is given by the threshold 70. As Asset 31 and 33 are not eligible, their weights are set to 0 as illustrated in column (1) of Table 2.

Applying this ESG rule to each sector and keeping benchmark initial weights, we have a new universe for eligible ESG investment that represents 58.46% of the initial benchmark, *i.e.*, the sum of weights of assets that are excluded is equal to 41.54 percent. Now, we need to rebase all weights to 100 percent. Column (2) gives weights for the ESG universe that sum to 1. To keep sectorial allocation neutral, we will adjust these new weights to ensure that, within each sector, the sum of weights is equal to the initial sector weight. This is achieved by multiplying all weights by the coefficient C_k calculated for Consumer Discretionary:

$$C_k = \frac{W_{B,k\cdot}}{W_{ESG,k}} = \frac{5.33}{8.04}$$

The new weight for each asset in the ESG benchmark is equal to

$$W_{ESG,i} = Column(2) \times C_k$$

hence for asset 25,

$$W_{ESG,25} = 0.78 \times \frac{5.33}{8.04} = 0.52$$

Table 2

	$W_{B,k}$
Communication services	22.47
Consumer discretionary	5.33
Consumer staples	12.90
Energy	11.08
Financials	14.41
Health care	12.35
Industrials	11.58
Information technology	9.88
Total	**100.00**

Table 3

Consumer discretionary	ESG Metrics	$W_{B,k}$	(1)	(2)	$W_{ESG,k}$·
Asset 25	81.54	0.46	0.46	0.78	0.52
Asset 26	78.17	0.18	0.18	0.31	0.21
Asset 27	93.53	0.42	0.42	0.72	0.48
Asset 28	76.30	1.01	1.01	1.74	1.15
Asset 29	72.28	0.51	0.51	0.87	0.58
Asset 30	71.48	0.70	0.70	1.20	0.79
Asset 31	*66.72*	*0.30*	*0.00*	*0.00*	*0.00*
Asset 32	76.71	0.98	0.98	1.68	1.12
Asset 33	*63.90*	*0.33*	*0.00*	*0.00*	*0.00*
Asset 34	75.61	0.43	0.43	0.73	0.49
		5.33	**4.70**	**8.04**	**5.33**

Table 4

	$W_{B,k}$	$W_{ESG,k}$	$R_{B,k}$	$R_{ESG,k}$	$CR_{B,k}$	$CR_{ESG,k}$	$CR_{B\ to\ ESG,k}$
Sector A	22.47	22.47	0.76	0.94	0.17	0.21	0.04
Sector B	5.33	5.33	1.29	1.76	0.07	0.09	0.03
Sector C	12.90	12.90	1.82	2.45	0.24	0.32	0.08
Sector D	11.08	11.08	3.04	4.09	0.34	0.45	0.12
Sector E	14.41	14.41	-4.36	5.35	-0.63	0.77	1.40
Sector F	12.35	12.35	2.57	1.50	0.32	0.19	-0.13
Sector G	11.58	11.58	3.59	2.85	0.42	0.33	-0.09
Sector H	9.88	9.88	0.24	0.22	0.02	0.02	0.00
Total	**100.00**	**100.00**	**0.94**	**2.38**	**0.94**	**2.38**	**1.44**

As we have created an ESG benchmark that is neutral in sector allocation, it is straightforward to calculate the effect of moving from the initial benchmark to the ESG benchmark.

Table 4 illustrates this effect, which is equal to 1.44 percent. Applying Equation (3), we are able to calculate the contribution of each sector to the ESG effect. Although these numbers are calculated for one period only, it can be extended to a multi-periodic framework by selecting an appropriate chaining algorithm.

We note that the sectorial weights between the initial and ESG benchmark are equals, which reflects that the ESG benchmark is neutral in sector allocation. These weights are not equal at the security level as illustrated by Table 3. Because security weights are different, the contribution of each security to the sector level is different, and the sum of these differences gives the ESG Effect.

After isolating the ESG Effect, it is now possible to apply standard attribution models to measure allocation, selection and interaction effect. As these models are well known in the industry, we only show final results. Allocation and selection effects explain the active return between the portfolio and the ESG benchmark.

The attribution model for ESG Issuer Strategy decomposes the total active return into one ESG component and standard Brinson effect. This model can be viewed as a successive benchmark methodology where we

create one intermediary ESG benchmark used for standard attribution.

Table 5 illustrates the results of applying the Brinson and Fachler attribution model where we have added the interaction effect to the selection effect.

For the period under review, the active return is equal to 2.31% = 3.25% - 0.94%. ESG strategy, which reduces the investment universe, has contributed to 1.44% while allocation and selection have contributed to 0.87% = 0.21%+0.66%. Note that we verify that the active return is equal to the sum of the ESG, the allocation and the selection effect. As this model keeps the additive structure, we can select an appropriate chaining algorithm.

2.2 NEGATIVE SCREENING FOLLOWED BY ESG ISSUER STRATEGY

Let us now analyze another strategy, which consists firstly to eliminate some industries (negative screening), and secondly, for all remaining industries, to select securities that meet the investor ESG requirements. To develop a model that attributes the active return to each active decision of the investment process, we must first understand precisely the decision process.

The first step of this strategy is to identify the industries (or any other grouping criteria) that are not eligible for investing. This first decision contributes to the active return and we want to be able to isolate this effect. We will call it the Screening Effect.

The second step consists of selecting in each eligible industry the assets that meet the ESG requirements; this will give the ESG Effect as presented in paragraph 2.1.

The following steps correspond to the calculation of attribution effect, such as allocation and selection for equity and balanced portfolio, and, carry, interest, and credit effects for fixed income portfolio.

Moving from the initial benchmark to a benchmark that doesn't invest in some industries is similar to an allocation decision in the spirit of Brinson models. Setting weights to 0 for some industries changes the weights of all other industries hence the sector allocation. To calculate this effect, we will refer to the Brinson, Hood and Beebower (BHB) allocation effect. We favor BHB because it gives the absolute contribution of not investing in a specific industry. To illustrate this, let us assume that the manager is not allowed to invest in the tobacco industry. This industry has delivered 12% return over the period and the benchmark allocates 4% to this sector. Under BHB, the opportunity cost of not investing in the sector is equal to

$$-0.04 \times 12 = -0.48\%.$$

Under Brinson and Fachler (BF), we would take the relative return instead of the absolute return. Assuming that the benchmark return over the period is 10%, BF model gives a contribution of this decision equal to

$$-0.04 \times (12 - 10) = -0.08$$

Nevertheless, as both BF and BHB sum to the same total effect, it is only a matter of presenting the effect at the

Table 5

	Fund %	Bench ESG %	Fund ret	Bench ret	Bench ESG ret	ESG Effect	Alloc	Select
Sector A	16.82	22.47	2.00	0.760	0.94	0.04	0.08	0.18
Sector B	8.22	5.33	1.99	1.285	1.76	0.03	-0.02	0.02
Sector C	11.82	12.90	4.65	1.824	2.45	0.08	0.00	0.26
Sector D	14.98	11.08	2.49	3.036	4.09	0.12	0.07	-0.24
Sector E	16.87	14.41	6.39	-4.358	5.35	1.40	0.07	0.18
Sector F	8.71	12.35	1.78	2.570	1.50	-0.13	0.03	0.02
Sector G	11.74	11.58	4.50	3.587	2.85	-0.09	0.00	0.19
Sector H	10.84	9.88	0.64	0.236	0.22	0.00	-0.02	0.05
Total	**100.00**	**100.00**	**3.25**	**0.94**	**2.38**	**1.44**	**0.21**	**0.66**

industry level and not the overall effect. In this article, we present the result only for BHB.

The model decomposes active return into Screening Effect, ESG Effect, Allocation Effect and Selection.

$$R_P - R_B = \underbrace{(R_{NS} - R_B)}_{Screening\ Effect} + \underbrace{(R_{ESG} - R_{NS})}_{ESG\ Effect} + \underbrace{(R_{ESG} - R_{NS})}_{ESG\ Effect} + \underbrace{(R_P - R_{ESG})}_{Brinson\ Allocation\ and\ Selection} . \quad (5)$$

Screening Effect: $(R_{NS} - R_B)$

The screening effect measures the contribution of not investing in some industries and reallocating this amount proportionally on all other industries. The allocation effect is calculated for each industry (Equation 6). The sum of allocation gives the Screening Effect.

$$Screening\ Effect_k = \sum_{i \epsilon k} (W_{NS,i} - W_{B,i}) \times R_{B,k} \quad .(6)$$

And

$$R_{NS} - R_B = \sum_k Screening\ Effect_k$$

Selection and Interaction effect have to be equal to 0, which is realized by setting the new weights as follows:

$$W_{NS,i} = \begin{cases} \frac{W_{B,i}}{\sum_j W_{B,j}}, & j \in eligible\ industries \\ 0, & prohibited\ industries \end{cases}$$

Using these weights, we guarantee that returns of each industry *k* are equal between the initial and the negative screening benchmark.

$$R_{NS,k} = \sum_{i \epsilon k} \left[\left(\frac{w_{B,i}}{\sum_j w_{B,j}} \right) \Big/ \left(\sum_{s \in k} \frac{w_{B,s}}{\sum_j w_{B,j}} \right) \right] \times$$

$$r_{B,i} = \sum_{i \epsilon k} \left(\frac{w_{B,i}}{\sum_{s \in k} w_{B,s}} \right) \times r_{B,i} = R_{B,k}$$

Screening Effect measures the consequence of setting weights for some industries to 0 and reallocating these weights proportionally to all eligible sectors. Proportional allocation does not change the return for each industry; hence negative screening corresponds to an allocation decision only.

ESG Effect: $(R_{ESG} - R_{NS})$

Within eligible industries, securities are ranked on their ESG score. All securities that fail to meet the minimum ESG score are removed from the investment universe. Now, we measure the contribution of moving from the benchmark obtained after screening to the ESG benchmark. This is achieved by replicating the same procedure as presented in section 2.1. We only have to replace the weights of the initial benchmark by the weights obtained after screening.

$$W_{ESG,i} = \begin{cases} \frac{W_{NS,i}}{\sum_{ESG\ metrics > Threshold} W_{NS,i}} \times C_k, & ESG\ Metrics > Threshold \\ 0, & ESG\ Metrics < Threshold \end{cases}$$

Table 6

	$W_{B,k}$	$W_{NS,k}$	$R_{B,k}$	$R_{NS,k}$	Screening Effect
Sector A	22.47	27.04	0.760	0.760	0.035
Sector B	5.33	0.00	1.285	1.285	-0.068
Sector C	12.90	15.53	1.824	1.824	0.048
Sector D	11.08	13.34	3.036	3.036	0.068
Sector E	14.41	17.34	-4.358	-4.358	-0.128
Sector F	12.35	14.87	2.570	2.570	0.065
Sector G	11.58	0.00	3.587	3.587	-0.415
Sector H	9.88	11.89	0.236	0.236	0.005
Total	**100.00**	**100.00**	**0.939**	**0.548**	**-0.391**

ESG effect is obtained as follows:

$$ESG\ Effect = R_{ESG} - R_{NS} = \sum_{Securities} CR_{NS\ to\ ESG,i} \quad . \quad (7)$$

With

$$CR_{NS\ to\ ESG,i} = \left(w_{ESG,i} \times r_{B,i} - w_{NS,i} \times r_{NS,i}\right) \quad . \quad (8)$$

Allocation and Selection Effect: $(\boldsymbol{R_P - R_{ESG}})$

This corresponds to the standard Brinson style methodology where the return of the benchmark is replaced by the return of the synthetic ESG benchmark.

EXAMPLE 2

Let us assume that the portfolio benchmark has the following sectorial allocation. For the sake of neutrality, we have replaced the industry names by A, B, C… The fund cannot invest in Sector B and G.

We verify that

$$W_{NS,A} = \frac{22.47}{22.47 + 12.90 + 11.08 + 14.41 + 12.35 + 9.88} \times 100 = 27.04$$

$$R_{NS} = 0.2704 \times 0.76 + 0.1553 \times 1.824 + 0.1334 \times 3.036 - 0.1734 \times 4.358 + 0.1487 \times 2.57 + 0.1189 \times 0.236 = 0.548$$

Table 7

	$W_{B,k}$	$W_{NS,k}$	$W_{ESG,k}$	$R_{B,k}$	$R_{NS,k}$	$R_{ESG,k}$	Screening Effect	ESG Effect
Sector A	22.47	27.04	27.04	0.760	0.760	0.943	0.035	0.049
Sector B	5.33	0.00	0.00	1.285	1.285	1.285	-0.068	0.000
Sector C	12.90	15.53	15.53	1.824	1.824	2.447	0.048	0.097
Sector D	11.08	13.34	13.34	3.036	3.036	4.087	0.068	0.140
Sector E	14.41	17.34	17.34	-4.358	-4.358	5.354	-0.128	1.684
Sector F	12.35	14.87	14.87	2.570	2.570	1.500	0.065	-0.159
Sector G	11.58	0.00	0.00	3.587	3.587	3.587	-0.415	0.000
Sector H	9.88	11.89	11.89	0.236	0.236	0.219	0.005	-0.002
Total	**100.00**	**100.00**	**100.00**	**0.939**	**0.548**	**2.357**	**-0.391**	**1.810**

Table 8

	$w_{B,k}$	$w_{P,k}$	$r_{B,k}$	$r_{P,k}$	Screening Effect	ESG Effect	Alloc	Selec
Sector A	22.47	21.02	0.760	2.001	0.035	0.049	0.085	0.222
Sector B	5.33	0.00	1.285	0.000	-0.068	0.000	0.000	0.000
Sector C	12.90	14.77	1.824	4.654	0.048	0.097	-0.001	0.326
Sector D	11.08	18.71	3.036	2.491	0.068	0.140	0.093	-0.299
Sector E	14.41	21.08	-4.358	6.393	-0.128	1.684	0.112	0.219
Sector F	12.35	10.88	2.570	1.779	0.065	-0.159	0.034	0.030
Sector G	11.58	0.00	3.587	0.000	-0.415	0.000	0.000	0.000
Sector H	9.88	13.54	0.236	0.637	0.005	-0.002	-0.035	0.057
Total	**100.00**	**100.00**	**0.939**	**3.201**	**-0.391**	**1.810**	**0.288**	**0.556**

And

$$\left(W_{NS,A} - W_{B,A}\right) \times R_{B,A} = (0.274 - 0.2247) \times 0.76 = 0.035$$

The total Screening Effect is equal to the sum of Screening Effect per sector or equal to 0.547 - 0.939 = -0.391.

Using the assumptions and numbers presented in Example 1, we can calculate the ESG Effect. The only difference is that it measures the contribution of moving from the synthetic screening benchmark to the synthetic ESG benchmark.

We verify that all $R_{ESG,k}$ are the same as in Table 4 for all sectors but the two sectors that are prohibited for investments. For the two sectors that are prohibited, the ESG return is equal to the benchmark return. We apply Equation 8 to calculate the contribution of each sector to the ESG Effect:

$$CR_{NS\ to\ ESG,A} = (0.2704 \times 0.943 - 0.2704 \times 0.76) \quad 0.049$$

Finally, we apply standard Brinson Fachler attribution to decompose the active return between the synthetic ESG benchmark and the fund. The complete attribution model is illustrated in Table 8.

Table 8 above illustrates the breakdown of the return as well as the allocation of components to each step of the investment process. Thus, the active return of 2.26% is explained by a component of -0.39% for negative screening and 1.81% for the Best in Class strategy, *i.e.*, a total of 1.42% attributed to ESG constraints. Then, a standard allocation is made against the synthetic benchmark resulting from the screening and best in class strategies. The model then assigns 0.29% to the allocation and 0.56% to the selection.

CONCLUSION

ESG strategies can be grouped into two main categories, those that modify the investment universe and those that aim to have an impact or influence the behavior of firms. In this article, we have focused on strategies that have an impact on the investment universe. Moreover, in these strategies, we have distinguished two different situations; the first one assumes that the restriction of the eligible universe is based on indisputable criteria such as controversial weapons. In the second, the eligible universe is defined by ESG criteria or scores that may depend on the expectations of the managers or asset owners. This article has focused on the latter situation because, as much for strategies based on indisputable criteria, we can identify reference indices, as much for strategies using individual preferences, it becomes impossible to identify indices integrating these preferences.

The proposed methodology makes it possible to identify and measure the contributions of ESG strategies, both in terms of their impact on stock allocation and selection. In addition, a methodology based on successive benchmarks allows comparison with standard indices. The methodology is thus applicable to a large number of ESG strategies and allows active management to be compared between funds constrained by ESG criteria and those that have no such constraints.

REFERENCES

Brinson, Gary P., Hood, L. Randolph, and Gilbert L.Beebower, "Determinants of Portfolio Performance," *Financial Analysts Journal,* July/August, 1986.

Brinson, Gary P., Brian D. Singer, and Gilbert L. Beebower, "Determinants of Portfolio Performance II: An Update," *Financial Analysts Journal*, 47, 3, 1991.

Søren Hvidkjær . "ESG investing: a literature review," Working Paper, September 2017.

ENDNOTES

[1] Sustainable Accounting Standards Board.

[2] SASB's mission as defined on the company website (https://www.sasb.org/).

[3] An example is MSCI Socially Responsible Investing (SRI).

[4]The Wall Street Journal, Sept. 17, 2018. "Is Tesla or Exxon More Sustainable? It Depends Whom You Ask."

[5] SASB'S SUSTAINABLE INDUSTRY CLASSIFICATION SYSTEM® (SICS®, (https://www.sasb.org/).

[6] Some examples are GRAP, Carino or Menchero among others.