Unintended Consequences: How ESG Preferences Can Potentially Bring Unexpected Style Exposure in Equity Indices

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How do ESG preferences affect the risk and return characteristics of a portfolio? Do they add style biases or increase sensitivity to specific macro-economic variables like interest rates and oil prices? In this article we approach these questions using a case study using a real index series that incorporates a range of ESG preferences in different layers. This layered structure allows us to measure the impact of each individual ESG preference separately in the context of an investable index.

ACADEMIC STUDIES SHOW THAT ESG INVESTING DOES NOT NEGATIVELY IMPACT RETURNS, BUT HOW DOES IT AFFECT RISK?

Much of the debate and literature on ESG investing is about financial returns. In their meta study, Atz et al. (2023) found that, on average, there is no distinction between the financial performance of ESG investments to that of conventional investments. Gao et al. (2024) and Pollak et al. (2024) also found that ESG investing does not generally negatively affect returns. But there has been far less focus on risk. Although Atz et al. (2023) postulate that ESG investing provides asymmetric benefits, especially during a social or economic crisis, more detailed analyses on the risk characteristics of ESG investing are not widespread in the literature.

This article aims to contribute to the literature by analyzing ESG investing in developed market equities by evaluating risk factors including sensitivities to style tilts and macro-economic variables. The basis for this research is an investable index series that has been used as a benchmark for an index fund.

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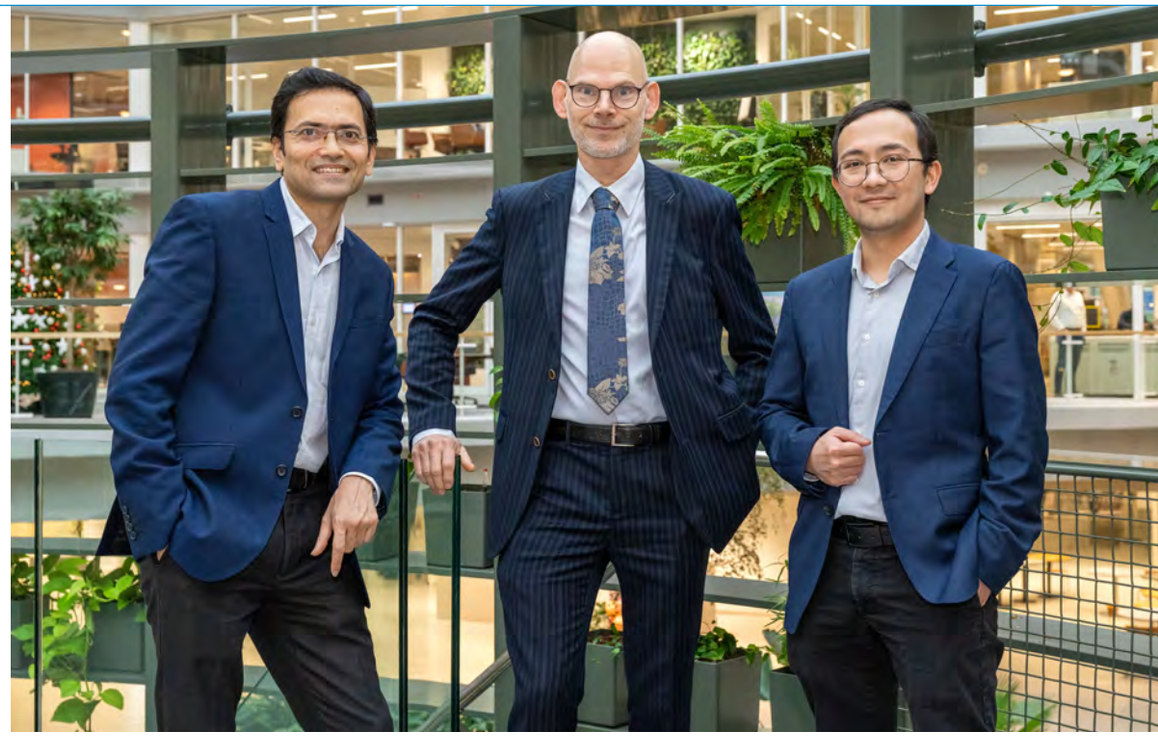

A BESPOKE INDEX WITH FOUR ESG LAYERS

The index series used for the investigations covered in this paper is the iSTOXX® APG World Responsible Low-Carbon SDI Index. This index was launched in March 2020 as part of a family of five indices, where each index contains one or more layers of ESG preferences. Exhibit 1 shows the different layers that comprise this index construction.[2]

This bespoke index was created to serve as the benchmark of an index fund, launched by APG Asset Management in September 2021: the APG Developed Equities RI Index Pool, where RI stands for Responsible Investing. This fund was launched to satisfy two client requirements. The first was to offer the option of investing in a passive rather than actively managed equity strategy. The second was to have ESG preferences implemented in a transparent way via a customized index rather than building a customized portfolio that deviates from a standard index, e.g. MSCI World, using ESG preferences as constraints.
Now, four years later, we look back and analyze the risk and return of the various ESG preferences in the RI index and show how these findings can be useful considerations when developing new ESG index methodologies. As the indices have been in place since 2020 and are not reconstructed with hindsight, our study does not suffer from any look-ahead bias.

RISK AND RETURN OF THE INDICES

This study first considers the five bespoke indices and the parent index. Exhibit 2 shows some characteristics of the indices. We used monthly gross returns (without currency hedging) in EUR from the end of March 2020 until the end of August 2024.

The return and absolute volatility of the six indices resemble each other. The biggest change in terms of the number of index constituents occurs in the second layer, when the inclusion criteria are applied. This is also visible in the increase of the tracking error after applying the second layer.

DISENTANGLING THE RI COMPONENTS

This family of indices makes it possible to calculate the impact of each ESG layer separately by taking the return differential between the two relevant indices within the series. Exhibit 3 shows the series of return differential series that were calculated.

Exhibit 1
The four steps from parent index to benchmark

The process starts with a reference index. Each further layer of ESG preferences is implemented by constructing an additional index where the tracking error versus the parent index is minimized while satisfying certain ESG criteria and a range of risk and liquidity constraints.

Indices	ESG layer
iSTOXX World A Index	The reference index, also called parent index, for constructing the bespoke benchmark is the iSTOXX World A Index. Its scope is large- and mid-cap stocks in developed equity markets.
iSTOXX APG World-X Index	The first layer of ESG preference is exclusion. This index excludes nuclear-weapon and cluster-munition producers, tobacco companies and UN Global Compact violators from the eligible universe.
iSTOXX APG World Responsible Index	The second layer of ESG preference is implemented using the client's inclusion policy. Here so-called ESG laggards are removed from the eligible universe. These are either companies involved in controversies or controversial products or services, or companies that fail to meet minimum conduct criteria on labor rights, human rights and governance.
iSTOXX APG World Responsible Low-Carbon Index	The third layer, applied to the iSTOXX APG World Responsible Index, implements the reduction of the carbon footprint by 20% versus the parent index in 2020, with a stepwise increase to a reduction of 33.33% in 2025.
iSTOXX APG World Responsible SDI Index	An alternative third layer, also applied to the iSTOXX APG World Responsible Index, implements a minimum investment percentage in Sustainable Development Investments (SDIs): These are investments that contribute to the Sustainable Development Goals (SDGs). The initial SDI floor in 2021 was 15% of the index, with a stepwise increase to 20% in 2025.
iSTOXX APG World Responsible Low-Carbon SDI Index	A further fourth layer can be created by applying the criteria of the iSTOXX APG World Responsible SDI Index to the iSTOXX APG World Responsible Low-Carbon index. This is the benchmark for the index portfolio.

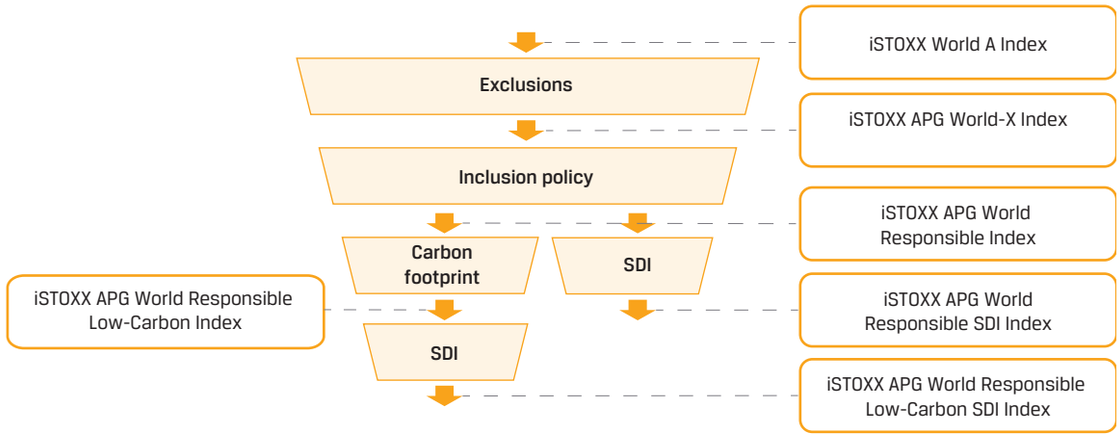

Exhibit 2
The risk, return and number of index constituents

Index	Number of constituents (average over period)	Average returns (annualized, in %)	Volatility (annualized, in %)	Tracking Error versus parent index (annualized, in %)	Maximum drawdown versus parent index (in %)
iSTOXX World A	1,644	18.10	13.90	–	–
iSTOXX APG World-X	1,422	18.16	13.98	0.36	1.07
iSTOXX APG World Responsible	665	18.18	14.07	1.03	1.60
iSTOXX APG World Responsible Low-Carbon	664	18.21	14.09	1.02	1.60
iSTOXX APG World Responsible SDI	646	18.03	14.10	1.02	1.82
iSTOXX APG World Responsible Low-Carbon SDI	643	18.05	14.11	1.02	1.83

From Exhibit 4, we conclude that there are significant negative return effects in Cases D and E. This is mainly due to the addition of the SDI layer in Case D. Adding SDI layer leads to different constituents between iSTOXX APG World Responsible SDI Index and iSTOXX APG World Responsible Index. As of 30th August 2024, 11.4% of constituents in iSTOXX APG World Responsible SDI Index are not included in iSTOXX APG World Responsible Index. On the other hand, iSTOXX APG World Responsible Low-Carbon Index has very similar constituents as iSTOXX APG World Responsible Index, where only 0.18% constituents in iSTOXX APG World Responsible Low-Carbon Index are not included in iSTOXX APG World Responsible Index. This suggests that the addition of Low-Carbon layer does not really change the optimized index, while adding the SDI layer does.

In Case E, the negative return effect from adding the SDI layer is greater than the positive effect of adding the Low Carbon layer in Case C. Thus, there is a significantly negative effect in Case E. Finally, in Case F, it is evident that the total effect is not statistically significant.

DO ESG PREFERENCES CORRELATE WITH STYLE TILTS?

The next question we investigate is whether the ESG preferences cause style tilts. Although the index construction is controlled for ex ante style tilts versus the parent index, some style tilt may occur ex post. We investigate this by carrying out a regression analysis of the return differentials in Cases A to F on the excess returns of MSCI factor indices versus the MSCI World Index. The use of MSCI factor or style indices enables a check to be carried out on the iSTOXX indices for the presence of style tilts with an independent measure of these tilts. For the style returns (R_{style}) we use the following factor indices for measuring the style tilt of the iSTOXX indices versus the style indices: (1) MSCI World Enhanced Value Index, (2) MSCI World Equal Weighted Index (representing the tilt to Size, i.e. small cap versus large cap), (3) MSCI World Momentum Index, (4) MSCI World Quality Index, and (5) MSCI World Minimum Volatility Index. We also include the market returns (R_{market}) minus the risk-free rate (R_f) as regressor to control for market beta tilt. The market returns are MSCI World Standard (large cap and mid cap).

Exhibit 3
The return differentials of the five RI components

Case	RI component	Return differential calculated as
A	Exclusion policy	iSTOXX APG World -X -/- parent index
B	Inclusion policy	iSTOXX APG World Responsible -/- iSTOXX APG World -X
C	Low Carbon	iSTOXX APG World Responsible Low-Carbon -/- iSTOXX APG World Responsible
D	SDI	iSTOXX APG World Responsible SDI -/- iSTOXX APG World Responsible
E	Combined Low Carbon and SDI	iSTOXX APG World Responsible Low-Carbon SDI -/- iSTOXX APG World Responsible
F	TOTAL	iSTOXX APG World Responsible Low-Carbon SDI -/- parent index

Exhibit 4
The risk and return of the RI components

The t-statistics is reported with the null hypothesis that the mean of the return differential is equal to zero. ** and * indicate statistical significance at 5% and 10% level. The sample period is from the end of March 2020 until the end of August 2024.

Case	Average return differential (annualized, in %)	Standard deviation of return differentials (ann., in %)	t-stats
A Exclusion	0.065	0.364	0.373
B Inclusion	0.021	1.084	0.041
C Low Carbon	0.027	0.067	0.855
D SDI	–0.156**	0.136	–2.414
E Low Carbon & SDI	–0.135*	0.145	–1.969
F Total	–0.050	1.015	–0.103

Exhibit 5
Regression results for style tilts

The t-statistics are reported in bracket. ***, **, and * indicate statistical significance at 1%, 5% and 10% level. The sample period is from the end of March 2020 until the end of August 2024.

Variables	Case A Exclusion	Case B Inclusion	Case C Low Carbon	Case D SDI	Case E Low Carbon & SDI	Case F Total
α	-0.000	-0.000	0.000	-0.000**	-0.000**	-0.000
	(-0.367)	(-0.186)	(0.186)	(-2.381)	(-2.138)	(-0.633)
Market return minus risk free rate	0.001	0.030*	0.001	0.002	0.003	0.034**
	(0.267)	(1.912)	(0.754)	(1.099)	(1.325)	(2.342)
Value	0.002	0.030	-0.001	-0.003	-0.004	0.028
	(0.196)	(1.174)	(-0.627)	(-1.022)	(-1.147)	(1.171)
Size	-0.003	-0.007	-0.003	0.016**	0.013**	0.003
	(-0.205)	(-0.133)	(-1.066)	(2.567)	(2.030)	(0.073)
Momentum	-0.009	0.064***	-0.001	0.006**	0.005	0.060***
	(-1.192)	(2.806)	(-0.753)	(2.070)	(1.592)	(2.829)
Quality	0.035**	-0.016	-0.007**	0.004	-0.002	0.017
	(2.237)	(-0.330)	(-2.518)	(0.715)	(-0.317)	(0.388)
MinVol	-0.004	0.032	-0.001	-0.001	-0.002	0.026
	(-0.409)	(1.176)	(-0.628)	(-0.410)	(-0.488)	(1.053)
adj. R2	0.125	0.079	0.118	0.097	0.102	0.096
N Obs.	53	53	53	53	53	53

We select the regressors from a practitioner's perspective, emphasizing on well-known styles. From an academic standpoint, our choices align with the Fama and French (2015) five-factor model and Carhart's (1997) model. The regressors we use include the market return minus the risk-free rate, the MSCI World Enhanced Value Index, the MSCI World Equal Weighted Index, and the MSCI World Momentum Index, which correspond to the Market, Value, Size, and Momentum factors outlined in the Fama and French (2015) model and Carhart (1997) momentum factor. Additionally, we incorporate the MSCI World Quality Index, which employs Return on Equity amongst others to calculate its quality score, aligning with the RMW (robust minus weak profitability) factor in Fama and French (2015).

Finally, we include the MSCI World Minimum Volatility Index as a proxy for low-volatility stocks. Fama and French (2016) observe that the returns of low-beta stocks often resemble those of profitable firms that invest conservatively. An interpretation would be that low-volatility (high-volatility) stocks exhibit traits similar to those of profitable (unprofitable) and conservative (aggressive) firms. These relationships are reflected in the RMW (Robust Minus Weak) and CMA (Conservative Minus Aggressive) factors of the Fama and French (2015) five-factor model. Hence, the MSCI World Minimum Volatility Index is chosen as a relevant regressor in this analysis.

So, for the exclusion criteria (Case A), the regression equation for the return differential R_A reads:

$$R_A(t) = \alpha + \beta \cdot [R_{market}(t) - r_f(t)] + \sum_{i=1}^{5} \gamma_i \cdot (R_{style\ i}(t) \cdot R_{market}(t) + \epsilon(t)$$

A similar equation has been used for Cases B, C, D, E and F. Exhibit 5 shows the results.

The results show that the constant term in the regressions is significantly negative for Cases D and E (the SDI layer and the combined SDI and Low-Carbon layer in the index). This means that part of the return differential cannot be explained by factor tilts and is due to idiosyncratic return. However, for the total effect in Case F, the intercept is not statistically significant. Interestingly, while we observe a non-significant negative returns effect for Case F in Exhibit 4, the regression suggests that iSTOXX APG World Responsible Low-Carbon SDI Index has different exposure to Market and Momentum factors compared to its parent index.

For Case F, we conclude that the iSTOXX APG World Responsible Low-Carbon SDI Index has a higher Market and Momentum exposure or tilt than its parent index. This difference mainly comes from the inclusion layer, which is shown in Case B. The parameters for the factor tilts show that some layers exhibit a small tilt, but other than Market (beta) and Momentum, there are no significant tilts shown in Case F.

Thus, we can conclude that iSTOXX APG World Responsible Low-Carbon SDI Index has higher style exposure to Momentum and Market (beta) than the parent index. Although the index is constructed in such a way that style tilts are controlled for ex ante, these tilts can creep in the time series ex post. One reason for this is that style tilts are controlled only on the index rebalance date. As constituent weights drift from the last rebalance, the index may exhibit style biases until it is rebalanced again. Additionally, the index design manages style tilts based on Axioma Risk Model Style factors. Therefore, when the index is analyzed for style tilts using an independent style definition, part of the tilt may be attributed to differences in definitions.

DO ESG PREFERENCES CORRELATE WITH MACRO-ECONOMIC VARIABLES?

Another way to look at risk is in the context of sensitivities to macro-economic variables. For this analysis, we choose the following variables: changes in short-term interest rates (EUR), changes in the slope of the term structure (EUR) and changes in the oil price.[3]

We perform the following regression for Case A (and similarly for Cases B to F):

$$R_A(t) = \alpha + \sum_{i=1}^{3} \delta_i \cdot X_i(t) + \varepsilon(t)$$

Where
X_1= change in EUR 1 year rate
X_2= change in EUR 10 year – 1 year slope
X_3= change in oil price (percentage)

Exhibit 6 shows the results.

We observe that none of the macro-economic factors is significantly linked to the total layer as shown in Case F. Cases D and E show a negative return effect, as indicated by the intercept coefficient, consistent with the analysis on the style factors. Furthermore, case D shows that there is a small negative exposure of the SDI layer to the change in EUR 10 year rate minus 1 year rate.

Thus, we conclude that for the total effect, ESG preferences do not introduce systematic tilts to macro-economic factors.

CONCLUSIONS

Consistent with earlier meta-studies, we observe that ESG preferences do not result in significant differences in performance (returns) as evidenced in the analysis of the ESG-tilted index (Case F) and the parent index. However, the ESG preferences can introduce some style tilts. This study shows that although it has been controlled for style tilts, the ESG-tilted index (Case F), has a statistically significant exposure towards the factors of Market (beta) and Momentum, measured using an alternative (independent) style definition from MSCI Indices. Also, there are no significant exposures to macroeconomic variables associated with any of the ESG preferences.

This research paper shows that in the case of an ESG-tilted index, it would be prudent to periodically evaluate the risk-return profile once the index has been implemented to ensure the ESG preferences and style exposures are working as desired. In this context, future research could build on these findings to explore methodologies to tilt an index towards ESG, while ensuring performance and risk exposure are maintained.

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Notes

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2 For technical details, we refer to page 722 of the index guide: https://www.stoxx.com/document/Indices/Common/Indexguide/istoxx_index_guide.pdf

3 Data sources: https://data.ecb.europa.eu/data/datasets/YC/YC.B.U2.EUR.4F.G_N_A.SV_C_YM.SR_1Y; https://fred.stlouisfed.org/series/DCOILWTICO

Exhibit 6
Regression results for macro-economic variables

The t-statistics are reported in bracket. ** and * indicate statistical significance at 5% and 10% level. The sample period is from the end of March 2020 until the end of August 2024.

Variables	Case A Exclusion	Case B Inclusion	Case C Low Carbon	Case D SDI	Case E Low Carbon & SDI	Case F Total
α	0.000	-0.000	0.000	-0.000**	-0.000*	-0.000
	(0.689)	(-0.455)	(0.955)	(-2.475)	(-1.958)	(-0.517)
ΔEUR1Y	-0.048	0.114	-0.002	-0.012	-0.010	0.055
	(-0.705)	(0.558)	(-0.158)	(-0.481)	(-0.369)	(0.291)
Δ(EUR10-1Y)	-0.068	-0.132	0.003	-0.064*	-0.055	-0.256
	(-0.729)	(-0.473)	(0.172)	(-1.840)	(-1.483)	(-0.977)
ΔOil	-0.001	0.004	-0.000	0.000	0.000	0.004
	(-0.891)	(1.363)	(-0.555)	(0.995)	(0.626)	(1.224)
adj. R2	-0.017	-0.015	-0.054	0.012	-0.015	-0.017
N Obs.	53	53	53	53	53	53