# The Case for Integrating ESG into Fixed Income Portfolios

**by**

**Andrew Clare, Aneel Keswani and Nick Motson[1]**

**City, University of London,**
**London. EC1Y 8TZ.**

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**Abstract**
In this paper we investigate the possible benefits of integrating ESG considerations into fixed income portfolio construction. When we create portfolios ranked by a composite ESG value or by an environmental ranking we find evidence to suggest that higher ESG rankings produce an improvement in risk-adjusted returns. When we use industry-standard tilting methodologies we find that portfolios can be tilted towards a particular ESG characteristic without having a material effect on the risk and return characteristics of the portfolios. Finally, we find some limited evidence to suggest that enhancing the ESG credentials of a portfolio can lead to a reduction in the tail risk of a portfolio, that is, it helps to reduce the frequency of extreme downside outcomes.

*JEL*: G0

***Keywords*: ESG; fixed income portfolios**

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## 1. Introduction

Over the last few years an increasing number of investors, both institutional and retail, have sought ways to invest in a more sustainable way. This desire to invest sustainably, which is being encouraged by regulators, has put the focus on Environmental, Social and Governance (ESG) considerations. It is arguably widely accepted that investing in companies that try to limit their impact on the environment, that operate in a way that is more beneficial to wider society and that have robust governance structures can all help to provide more sustainable outcomes for the benefit of all. There is, however, less consensus about how to integrate these considerations in investment portfolios and what impact these considerations are likely to have on the performance of these investment portfolios.

An increasing amount of research is being conducted to establish how ESG considerations can be incorporated into the construction of a fixed income portfolio and what impact this might have on the risk and return profile of the portfolio. With regard to implementation, researchers have investigated the impact of excluding certain sectors or companies from a portfolio or, alternatively, have investigated the impact of tilting towards desirable ESG characteristics. With regard to the impact of these approaches there is some evidence that building a more sustainable portfolio does lead to an improvement in risk-return characteristics.

ESG research focussed on fixed income is still a very new research area, which has been hampered in the past by ESG data coverage and span. But as time has gone by, the span of the data has improved, by definition, and ESG rating companies have expanded their coverage. This means that today, meaningful studies can be undertaken.

The purpose of our study is to provide further insight into the benefits or otherwise of integrating ESG considerations into a corporate bond portfolio. In this regard, our study adds to the small number of papers that have looked at this issue in fixed income markets; there are many more studies that have focussed on equity portfolios. We believe that the importance of corporate bonds as an asset class, particularly for institutional investors, means

that more work is required to establish the relationship between ESG Ratings and corporate bond portfolio performance.

Our work differs from previous work in this area. Previous research normalises the ESG scores of companies by subtracting the mean score for the sector that the company is in when choosing the weighting of companies. This however might lead to considering an arms manufacturer with the highest ESG score in that sector as being preferable to a wind farm company with the median ESG score for the wind farm sector. In contrast, in our study we have used raw ESG scores that are not sector adjusted to rank and exclude companies and then attribute sector effects. We believe that this is a more natural approach if the objective is to try and improve the ESG credentials of a portfolio.

We implement three methodologies that aim to shed light onto this issue including the construction of: ESG-ranked portfolios; ESG-tilted portfolios; and of portfolios that exclude some sectors from the portfolio. When we consider the performance of the ranked portfolios our results do suggest that ranking by a composite ESG value or by an environmental ranking produces higher risk-adjusted returns. The results of our portfolio tilt experiments indicate that portfolios can be tilted towards a particular ESG characteristic to enhance the exposure to this characteristic without having a material effect upon the risk and return characteristics of the portfolios relative to the benchmark. Finally, we find some limited evidence that enhancing the ESG credentials of a portfolio can lead to an improvement of the tail risk in a portfolio, that is, it helps to reduce the frequency of extreme downside outcomes.

The rest of this paper is organised as follows. In Section 2 we review the findings from previous work in this area. In Sections 3 and 4 we introduce the data and methodology used in the study respectively. In Section 5 we discuss some of the main results of the research. In section 6 we focus on the relationship between downside risk and ESG characteristics, and finally, in Section 7, we conclude the paper.

## 2. Previous work and findings

The interest from both institutional and retail investors in incorporating ESG considerations into investment portfolios, which is also being encouraged by a range of regulatory initiatives, has fostered an active research agenda. Both academic and industry researchers have sought to establish the impact that integrating ESG considerations into portfolios might have on the risk and return characteristics of those portfolio.

Researchers generally hypothesise three mutually inclusive explanations for a positive relationship between portfolio performance and the ESG credentials of that portfolio.

- The first hypothesis, that we might label the *cash flow channel*, conjectures that a stronger ESG profile leads to greater profitability and hence an enhanced ability to honour debt commitments, resulting in a lower probability of default.
- The second hypothesis, that we label the *idiosyncratic risk channel*, states that a stronger ESG profile might lead to lower tail risks potentially due to fewer ESG-related shocks.
- The third hypothesis relates to systematic risk. It is possible that portfolios with stronger ESG credentials may embody lower systematic risk. We label this channel the *systematic risk channel*.

### 2.1 Typical methodologies

To investigate these hypotheses researchers have adopted a number of approaches.

One approach compares the performance of a bond portfolio of top versus bottom-sorted ESG companies. If the risk and return characteristics of the portfolio comprising the highest quality ESG constituents significantly outperforms the constituents of a portfolio comprising lowest-rated ESG constituents, then it is possible to conclude that taking ESG into consideration can enhance the investor experience. It is important, however, to control for other factors that might explain the difference between the top and bottom-ranked ESG portfolios. One way of accounting for the other factors that might explain the performance between a top and bottom-sorted ESG portfolios is to adjust constituent weights so that the

other characteristics that might drive differences in portfolio performance are set to index level characteristics. In this way ESG portfolios can be compared on a like-for-like basis using this sort method.

A second method commonly used to test the link between performance and ESG characteristics is to use regression analysis. This regression method controls for other factors that might affect bond performance by including bond level characteristics such as the credit spread, or bond maturity in the regression as control variables. Some research papers use both the portfolio sort method, and the regression method.

### 2.2 Typical data used

In order to investigate the possible benefits of integrating ESG-type considerations into the construction of a corporate bond portfolio two data sources are needed. First, comprehensive data on the universe of bonds of interest. Second, a set of ESG scores or ratings for the bond issuers.

Studies typically take a universe of corporate bonds belonging to a particular bond index. Some studies use US bond indices, some use European bond indices, some use both, and a few recent studies also consider other regions including emerging markets. Furthermore, some studies focus only on corporate investment grade bonds while others include both investment grade and high yield bonds. A few more recent studies have looked at sovereign bond data.

Arguably of more importance is the choice of ESG ratings data. The majority of existing studies have used MSCI ESG data, although one recent study[2] made use of Sustainalytics ESG Ratings. However, there are other sources of ESG data. Each ESG data provider has their own approach to the calculation of these ratings. Some researchers have investigated the relationship between ratings provided by different providers[3]. Most recently Berg, Koelbel

[2] See Polbennikov (2019).

[3] For example, see Chatterji et al, 2016; Gibson Brandon et al, 2021; and Christensen et al, 2021.

and Rigobon (2022) investigated the relationship between ratings provided by the six main providers - KLD, Sustainalytics, Moody's, S&P Global, Refinitiv and MSCI. They argue that:

> *"For regulators, our study points to the potential benefits of harmonizing ESG disclosure and establishing a taxonomy of ESG categories. Harmonizing ESG disclosure would help to provide a foundation of reliable data. A taxonomy of ESG categories would make it easier to contrast and compare ratings within this common taxonomy."*

However, until methodologies are standardised – and we may be a very long way from this – it must be remembered that the results of any study using ESG ratings from a particular provider are conditional upon that rating company's methodology. Having said this, it should not prevent researchers from pursuing the relationship between ESG conduct and capital market risk and return.

We now provide a short summary of the findings of recent research papers that analysed the relationship between ESG ratings and the performance of bond portfolios.

### 2.3 Summary of previous findings

Using a sample of US and European investment grade and high yield bonds Mendiratta, Varsani and Giese (2021) find that after adjusting for other factor exposures there is only a significant return premium to high versus low ESG rated European investment grade bonds. They find this return premium to be 26 basis points per year.

Polbennikov et al (2016) use the regression approach in their work and the bond universe represented by the US investment grade Barclays corporate bond index. They find an ESG return premium of around 25 basis points per year per standard deviation of ESG score for the period 2007 to 2015. When they extend their study by two years and add in US high yield and European investment grade bonds they find that the overall ESG return premium rises to nearly 43 basis points per year per standard deviation of ESG score.

Bahra and Thukral (2020) use a sample of US and European investment grade and high yield bonds. They do not find a return premium to tilting a portfolio to top 20% ESG-ranked bonds. However because the ESG-tilted portfolios have lower risk than the benchmark, they show that ESG-tilted portfolios outperform the benchmark on a risk ratio-adjusted basis.

Ben Slimane, Le Guenedal, Roncalli, Sekine (2019) use a sample of US and European investment grade and high yield bonds and examine the effect of ESG tilts taking into account duration and spread duration differences. For European investment grade corporate bonds they find evidence of a risk-adjusted return premium of 37 bps per year for 2010-19. For US high yield bonds they also find that there is a return premium that has grown over time. By contrast, they do not find a significant return premium for US investment grade bonds.

Martellini and Vallee (2021) focus on sovereign issuers. They examine the ESG return premium using a sample of 35 sovereign issuers over the period from 2010 to 2020. They find that high ESG sovereign bonds typically underperform low ESG sovereign bonds but they also find that high ESG sovereign bonds are typically lower risk than low ESG sovereign bonds, that is, high ESG sovereign bonds have a higher Sharpe ratio than those in the low ESG sovereign bond group.

The research described briefly above does seem to indicate that there is an ESG premium for corporate bonds, although it may be relatively small. However, some studies have found no evidence of a significant relationship between ESG ratings and corporate bond performance.

Using a sample of US and European investment grade and high yield bonds Diep et al (2021) use the regression methodology and find no significant return premium to ESG-tilted portfolios. Fridson, Jiang, Mei and Navaei (2021) use a sample of US high yield bonds and compare the return on ESG-tilted, duration matched indices and find little evidence of a significant return premium.

In our work we use the portfolio sort methodology. To implement this methodology we use a universe consisting of bonds that make up the iBoxx European Corporate Bond Index.

Our ESG data is collected from Refinitiv[4]. In the next section of this paper we describe these databases.

## 3. Data

### 3.1 Bond universe

As the basis for this study we use the universe of bonds that comprise the iBoxx EUR Corporates bond index[5]. IHS Markit kindly provided us with the weights of each of the bonds that made up this index from 1999 to the end of 2021, plus descriptive data for each bond, including: price, coupon, gross redemption yield, maturity, duration, spread and rating. Using this data, we were able to determine how the ESG portfolios that we constructed differed in terms of performance relative to each other and relative to the iBoxx European Corporate Bond index.

### 3.2 ESG Data

To identify the possible impact of integrating ESG considerations into the construction of a corporate bond portfolio we needed to augment the bond data with ESG ratings for the underlying bond issuers. To this end we use Refinitiv's ESG Ratings. Like other ESG rating companies, Refinitiv calculates a composite ESG score, which is comprised of scores for E, S and G. They also provide scores for E, S and G, along with ten main sub-components. In total 186 metrics go in to the calculation of an issuer's ESG score(s). The majority of the results presented in this paper relate to the composite and individual E, S and G scores, but we have also conducted analysis on the 9 main components of these scores:

- **Environmental**: Resource Use; Emissions; and Innovation.
- **Social workforce**: Human Rights; Community; and Product Responsibility.
- **Governance**: Management; Shareholders; and CSR Strategy.

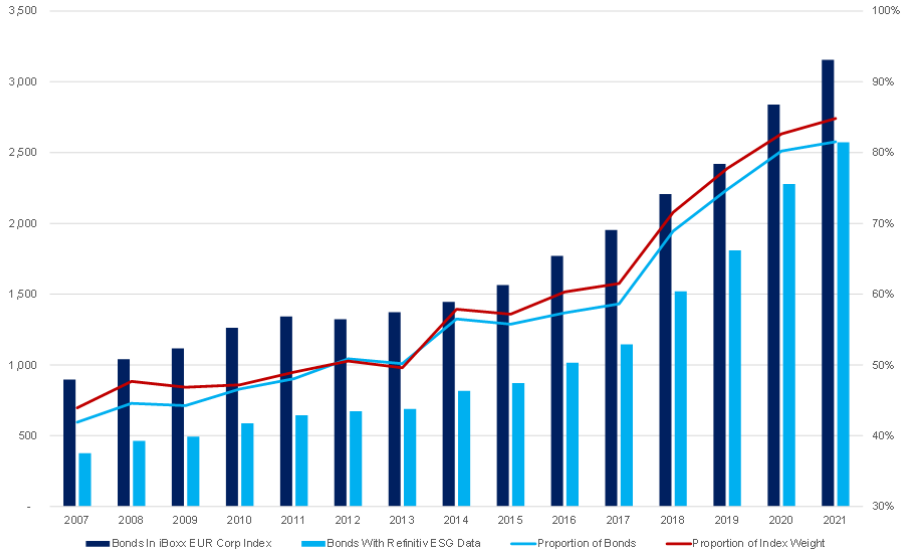
[4] Understanding ESG scores | Refinitiv Perspectives

[5] The iBoxx EUR Corporates bond index is the property of Markit Indices GmbH and/or its affiliates.

Refinitiv's ESG ratings aim to assess the fundamental ESG attributes, commitment and effectiveness of a corporation with regard to E, S and G. It is important to realise though that Refinitiv's approach is a relative one. That is, any issuer score is high or low, relative to the scores of others in the universe of corporations that they rate. Therefore, for example, a very low score for the environmental performance of an issuer does not necessarily mean that the issuer has no regard for the environment. However, if the rating is valid, it does mean that the issuer's impact upon the environment is estimated to be more harmful than those with a higher E Rating. This means that the Refinitiv universe is crucial in understanding their validity. Refinitiv rates over 11,000 companies globally, with time series data on these ratings going back as far as 2002. This universe comprises around 80% of global market capitalisation. With regard to our purpose here in looking at the European corporate bond market, Refinitiv currently collect data and update this data regularly on over 2,100 European corporates. Finally, it is also important to clarify that the higher the rating, the better a corporate's performance on any particular ESG metric.

**Chart 1**

*This Chart shows how Refinitiv's coverage of the issuers that comprise* iBoxx EUR Corporates bond index *has evolved over time*




The ESG ratings industry is still developing. This means that not all corporations/issuers currently have an ESG rating and, perhaps more importantly, that the number of corporates with ESG ratings has been growing over time. Chart 1 shows the Refinitiv coverage of the bonds that comprise the iBoxx EUR Corporates bond index, from 2007 to 2021. In 2007 there were 897 bonds in the index; 376 of these had a Refinitiv ESG rating. These bonds with ESG

ratings represented about 44% of the weight of the index. The chart shows clearly how the coverage has gradually increased over time. By the end of 2021, just over [80%] of the bonds in the index had a Refinitiv ESG rating, representing approximately 85% of the index weight. Because of this coverage issue, in our empirical work we assess the impact of ESG factors over the ten year period from 2012 to 2022.

**Table 1**

This Table presents descriptive statistics for iBoxx EUR Corporates bond index and for the sample of ESG-rated issuers over the period 2012 to 2021

| | iBoxx EUR Corp | Bonds With ESG Data |
|---|---|---|
| Return (annualised) | 3.63% | 3.91% |
| Vol (annualised) | 3.72% | 3.95% |
| Sharpe | 0.97 | 0.99 |
| # Bonds | 2099 | 1402 |
| % of Weight | 100% | 66% |
| Rating (AAA =1 to BBB=4) | 3.33 | 3.34 |
| Duration | 5.04 | 5.32 |
| Yield | 1.27% | 1.32% |
| Spread To Benchmark Curve | 133 | 134 |

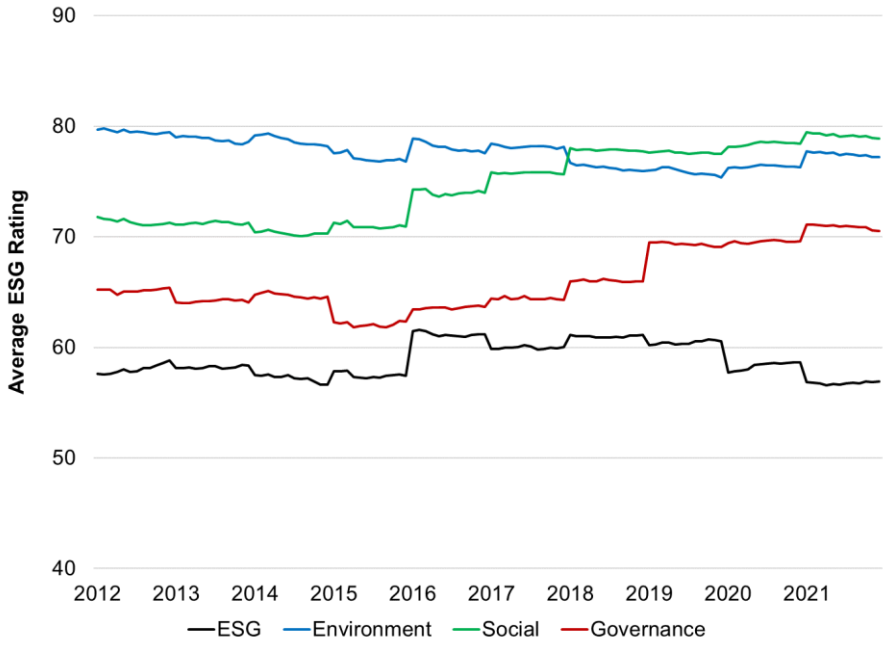
Table 1 presents descriptive statistics for the performance of the iBoxx European Corporate Bond Index and for the set of bonds in the index that had a Refinitiv ESG rating between 2012 and the end of 2021. The Table shows that the sample of issuers with ratings outperforms the broader index over this period by 0.28% p.a. The average duration of the reference portfolio was 5.04, compared to the ESG-rated sample which had average duration of 5.32. The Sharpe Ratios, however, are almost identical, as are the average credit rating of each set of bonds and the average spread to reference portfolio.

Because the rating coverage has increased over time, we need to understand whether there has been any underlying change in the ESG qualities of the sample. Chart 2 shows the average rating of the rated sample between 2012 and 2021. The combined score appears to be relatively stable, although there was a step up in this average between 2016 and 2019. The Environmental score is the highest, on average, of all the main scores. Chart 2 shows that there has been a gradual and slight decline in the average Environment score over time, from just under 80 in 2012 to [77] by the end of 2021. By contrast, both the average Social and

average Governance scores have improved over time. There are a number of ways of interpreting these facts about the sample that are, unfortunately, observationally equivalent. One explanation is that the sample of issuers covered have become: slightly less environmentally-minded (for want of a better phrase); more socially aware; and have higher average governance practices. Alternatively, the issuers may have become better at presenting their social and governance credentials to ESG rating companies over time. Or perhaps better at "greenwashing" these credentials. There is no way of knowing for sure, but we present these results in the interests of full transparency.

**Chart 2**

*This Chart shows the evolution of the average Refinitiv ESG ratings for the sample of rated bond issuers*




## 4. Methodology

There are a number of ways of assessing the impact of integrating ESG considerations into a bond portfolio. We use two main methods. The first, we refer to as the quintile methodology. The second involves tilting portfolios to and away from an ESG rating. We refer to this as the Tilting methodology.

*The Quintile Methodology*

The quintile methodology starts with the full universe of ESG-rated bonds. At the start of month 1 in our ten-year sample we rank the issuers according to one of the ESG ratings. We

then group those issuers with ratings in the top twenty percent into quintile 1; and those with ratings in the next twenty percent into quintile 2, and so on. We therefore create 5 ESG-ranked portfolios at the start of month 1. We calculate relevant statistics for these quintile portfolios, such as duration, average credit rating etc, and then monitor their performance over the month 2. We then repeat this process for month 2 and each subsequent month in our sample. This methodology produces five portfolios sorted monthly according to a particular ESG metric over a ten-year period.

To isolate the ESG impact on the performance of the quintile portfolios we must consider any inadvertent tilting towards particular sectors when coming to any conclusions. As an extreme example of what we mean here, if quintile 1's sector exposure is very different from the sector composition of the iBoxx European Corporate Bond Index, then some of the performance difference between quintile 1 and the index could be due to the difference in sector exposures. To overcome this difficulty for each quintile we adjust the sector exposure so that it matches the sector exposure of the iBoxx EUR Corporates bond index. In this way we isolate the ESG impact on any performance differential between the quintile portfolio and the index.

To be clear, we are not trying to suggest that investors should construct their portfolios in a similar way, however the differences in performance, particularly between Quintile 1 and Quintile 5, provide information about the value of integrating ESG considerations into a corporate bond portfolio.

*The Tilting Methodology*

A typical way to access a particular attribute is to construct a tilted portfolio, that is, where the weights are adjusted, up or down, from conventional index weights according to the individual constituents' characteristics. In our research we construct portfolios where the constituents are tilted according to their ESG Ratings. We investigated two different approaches to tilting, one which is commonly used by [MSCI] and the other that is commonly used by [FTSE]. Both methodologies involve the calculation of a characteristic z score. Z scores are calculated as follows:

(i) calculate the mean (μ) and standard deviation (σ) the ESG rating of all issuers

(ii) then, for each issuer (i), calculate the z score ($Z_i$) of its ESG rating ($x_i$) as follows:

$$\boldsymbol{Z_i = \frac{x_i - \mu}{\sigma}}$$

Z scores are easy to calculate and fairly easy to interpret too. A score of -1 means that the ESG rating of that particular constituent/issuer is one standard deviation lower than the average characteristic; while a score of 1.0 means that the constituent's ESG characteristic is one standard deviation higher than the average[6].

Using the z scores, the MSCI tilting methodology produces weights according to the following rule:

$$\boldsymbol{MSCI\ Tilt = \begin{cases} 1 + Z_i & Z \geq 0 \\ (1 - Z_i)^{-1} & Z < 0 \end{cases}}$$

The weight of a constituent that has a positive z score (which means that its z score is greater than the average z-score) is 1 + $Z_i$. A constituent with a negative z score is given a weight calculated as follows $(1+Z_i)^{-1}$.

Using the z-scores, the FTSE approach tilts the weights using the following function:

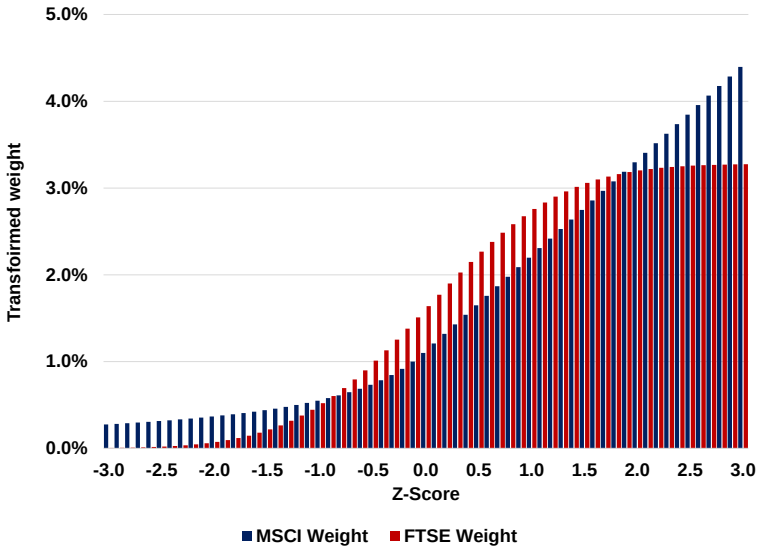
$$\boldsymbol{FTSE\ Tilt = \frac{1}{2}\int_{-\infty}^{Z} \frac{e^{-\frac{x^2}{2}}}{\sqrt{2\pi}} dx}$$

There is no right or wrong way of doing this, but to demonstrate the difference between the weights that the two approaches produce we have constructed an example portfolio where the constituent weights are equal. These constituents have z scores that range from -3 to +3. Chart 3 shows how the equal weights would be transformed by the two approaches. For those constituents of our universe with an ESG rating well below the average, and therefore having a negative ESG rating z score, the FTSE approach attaches a lower weight than the MSCI approach. The FTSE approach also attaches a lower weight to those constituents with very high ESG ratings (and therefore z scores). The FTSE approach attaches greater weight to those constituents either side of a z score of 0 than the MSCI approach.

[6]NB: When calculating these tilts constituent's whose z scores are less than -3 or greater than +3 are normally discarded as extreme cases, which means hat they will not be included in the tilted portfolio.

**Chart 3**

*An example of applying the MSCI and FTSE tilting methodology to portfolio weights*




*The exclusions methodology*

As well as implementing the quintile and tilting methodologies to assess the impact of ESG factors, we also consider an exclusion approach. This is a common approach to constructing a portfolio where investors' wish to express views that are not purely financial. It involves the exclusion of bonds issued by corporates form particular sectors. To investigate the possible impact of this approach to ESG investing we construct a bond portfolio where we exclude issuers from the following business sectors:

i. Tobacco
ii. Mining
iii. Oil and Gas
iv. Defence

We then compare the performance of the bond portfolio that excludes these sectors with the performance of the main index.

*Summary of methodology*

To explore the impact of embedding ESG considerations into the construction of a corporate bond portfolio, we have chosen three possible approaches: the construction of quintile

portfolios organised by ranking ESG Ratings, the construction of tilted portfolios using two industry-standard approaches; and finally, the construction of a portfolio that excludes the bonds of issuers from certain business sectors. In the next part of the paper we present the main results from our study.

## 5. Main results

### 5.1 Quintiles constructed using the Composite ESG Rating

In Panel A of Table 3 we present the performance of the five portfolios created by ranking bonds according to their issuer's composite Refinitiv ESG rating. In column 1 we see that this quintile that comprises the top 20% of issuers by the ESG composite score achieved an annualised return and volatility of 4.23% and 3.93% respectively, with an associated Sharpe Ratio of 1.07. On average the number of bonds in this quintile was 306; the average credit rating was 3.44 (where AAA= 1 and BBB = 4); the average duration, yield and spread to reference portfolio was 5.28%, 1.39% and 1.42% respectively. Finally, the average composite rating of the bonds' issuers was 81. In the final column we present equivalent statistics for the full sample of bonds in our ESG-rated universe. The table shows that quintile 1 produced a higher average return and the highest Sharpe Ratio. The credit rating of the portfolio was slightly lower than that of the reference portfolio, 3.44 compared to 3.34, and the average duration of quintile 1 was marginally lower, 5.28 compared to 5.32. We find the outperformance of quintile 1 over the reference portfolio to be statistically significant at the 90% confidence level.

It is important to note in Panel A of Table 3 that there is not a clear, monotonic relationship between the ESG rated quintiles and their performance statistics. In other words, there is not a smooth increase in average return from quintile 5 to quintile 1. Indeed, quintile 5 outperforms quintiles 2, 3 and 4. However, the overall results in Table 3 indicate that there may be some risk-return benefit from choosing issuers with a high ESG rating compared to those with lower ratings.

**Table 3**

*Forming portfolios into quintiles using Refinitiv's Composite ESG Rating: Descriptive Statistics*

***Quintile 1=highest 5=lowest***

| **Panel A: Portfolio metrics** | **1** | **2** | **3** | **4** | **5** | **Reference portfolio** |
|---|---|---|---|---|---|---|
| Return (annualised) | 4.23% | 3.67% | 3.82% | 3.87% | 3.95% | 3.91% |
| Vol (annualised) | 3.93% | 3.75% | 4.00% | 4.11% | 4.17% | 3.95% |
| Sharpe | 1.07 | 0.98 | 0.96 | 0.94 | 0.95 | 0.99 |
| # Bonds | 306 | 300 | 291 | 260 | 245 | 1402 |
| % of Weight | 20% | 20% | 20% | 20% | 20% | 100% |
| Rating (AAA =1 to BBB=4) | 3.44 | 3.41 | 3.32 | 3.26 | 3.28 | 3.34 |
| Duration | 5.28 | 5.31 | 5.18 | 5.42 | 5.40 | 5.32 |
| Yield | 1.39% | 1.24% | 1.30% | 1.30% | 1.35% | 1.32% |
| Spread To Benchmark Curve | 142 | 127 | 134 | 132 | 137 | 134 |
| Factor Score | 81 | 69 | 59 | 49 | 35 | 59 |
| **Panel B: Sectoral exposures** | | | | | | |
| Basic Materials | 1.57% | 1.17% | -0.38% | -0.13% | -2.24% | 0.00% |
| Consumer Goods | -2.65% | -2.35% | 2.06% | 2.85% | 0.08% | 0.00% |
| Consumer Services | -0.66% | 1.13% | -0.84% | -1.68% | 2.06% | 0.00% |
| Financials | 0.18% | -6.09% | -6.10% | 0.03% | 12.03% | 0.00% |
| Health Care | -0.90% | 1.20% | 0.18% | 1.15% | -1.65% | 0.00% |
| Industrials | 2.21% | 5.67% | 0.26% | -3.39% | -4.76% | 0.00% |
| Oil & Gas | 0.76% | -1.69% | 2.18% | 2.34% | -3.60% | 0.00% |
| Technology | 0.03% | 0.81% | -0.57% | -0.14% | -0.14% | 0.00% |
| Telecommunications | -3.05% | -3.83% | 3.83% | 0.63% | 2.43% | 0.00% |
| Utilities | 2.51% | 3.97% | -0.62% | -1.66% | -4.22% | 0.00% |
| ***Return Effect (annualised)*** | ***0.09%*** | ***-0.06%*** | ***-0.01%*** | ***-0.14%*** | ***0.12%*** | ***0.00%*** |

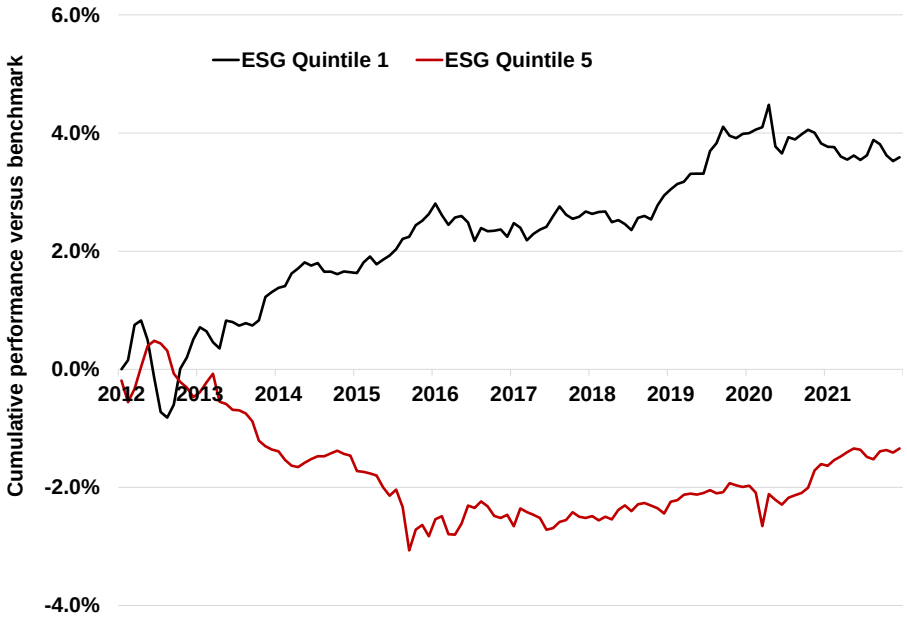
In Panel B of Table 3 we present the sectoral weights of the quintiles, relative to the reference portfolio. So, for example, quintile 1 is overweight the Basic Materials sector by 1.57%. Overall, the sectoral differences presented in Panel B are not particularly large, but the final row in the Panel, shows the impact sectoral exposure had on the performance of each quintile. Again using quintile 1 as an example, the sectoral differences between quintile 1 and the reference portfolio added 0.09% per annum to the performance of the portfolio. Therefore of the total outperformance of quintile 1 relative to the reference portfolio of 0.32%, 0.09% can be put down to sectoral differences between the portfolio and the reference portfolio and 0.23% to the "ESG effect".

Perhaps of more interest is the outperformance of quintile 1 over quintile 5. The components of quintile 5 had an average ESG composite score of 35, much lower than the equivalent score for Quintile 1. Over the full sample period, quintile 1 outperforms quintile 5 by 0.28% per annum. Chart 4 shows the cumulative performance of the two quintiles in excess of the

wider reference portfolio, and adjusted so that the sectoral weights are identical to those of the reference portfolio. The chart shows that the ESG effect is largely concentrated over two particular periods. First, the period between the beginning of 2013 and the start of 2016, and second the period between late 2018 and early 2020. This indicates that over short periods of time it is possible that the exposure to issuers with higher ESG ratings will not lead to a return benefit.

**Chart 4**

*Cumulative sector adjusted performance in excess of reference portfolio of Quintiles 1 and 5 formed using the Composite ESG Rating*




*Quintiles constructed using the Environmental Rating*

Table 4 shows the descriptive statistics for the quintile portfolios formed using Refinitiv's Environmental Rating. In Panel A we find that quintile 1 again has the highest average return (4.29%) and the second highest Sharpe Ratio (1.02). With regard to the other quintiles, although quintile 5 outperforms quintile 4, on the whole there is a decline in average performance as we move from issuers that have a relatively high E rating compared to those with a lower rating. Indeed, quintile 1 which has an average E Rating of 95, outperforms quintile 5, which has an average E Rating of 47, by 0.57% per annum. This outperformance difference would appear to be very attractive.

**Table 4**

*Forming portfolios into quintiles using Refinitiv's Environmental Rating: Descriptive Statistics*

***Quintile 1=highest 5=lowest***

| **Panel A: Portfolio metrics** | **1** | **2** | **3** | **4** | **5** | **Reference portfolio** |
|---|---|---|---|---|---|---|
| Return (annualised) | 4.29% | 4.09% | 3.91% | 3.50% | 3.72% | 3.91% |
| Vol (annualised) | 4.20% | 3.91% | 3.96% | 3.97% | 4.09% | 3.95% |
| Sharpe | 1.02 | 1.04 | 0.99 | 0.88 | 0.91 | 0.99 |
| # Bonds | 245 | 275 | 267 | 294 | 320 | 1402 |
| % of Weight | 20% | 20% | 20% | 20% | 20% | 100% |
| Rating (AAA =1 to BBB=4) | 3.29 | 3.28 | 3.27 | 3.42 | 3.45 | 3.34 |
| Duration | 5.00 | 4.90 | 5.39 | 5.71 | 5.59 | 5.32 |
| Yield | 1.44% | 1.32% | 1.28% | 1.22% | 1.33% | 1.32% |
| Spread To Benchmark Curve | 150 | 140 | 129 | 120 | 132 | 134 |
| Factor Score | 95 | 89 | 83 | 75 | 47 | 78 |
| **Panel B: Sectoral exposures** | | | | | | |
| Basic Materials | -1.98% | 2.02% | -0.07% | -0.86% | 0.91% | 0.00% |
| Consumer Goods | -1.15% | -0.42% | -4.51% | -2.63% | 8.74% | 0.00% |
| Consumer Services | -2.12% | -2.51% | -1.05% | 2.21% | 3.49% | 0.00% |
| Financials | 23.90% | 19.44% | -4.16% | -23.90% | -15.45% | 0.00% |
| Health Care | -4.19% | -1.67% | 2.96% | 2.32% | 0.60% | 0.00% |
| Industrials | -0.73% | -3.74% | 1.14% | -0.43% | 3.78% | 0.00% |
| Oil & Gas | 0.80% | -0.79% | -0.41% | 3.34% | -2.93% | 0.00% |
| Technology | -2.26% | -2.25% | -0.10% | 3.69% | 0.92% | 0.00% |
| Telecommunications | -9.88% | -6.03% | 4.12% | 9.97% | 1.86% | 0.00% |
| Utilities | -2.38% | -4.04% | 2.08% | 6.28% | -1.92% | 0.00% |
| ***Return Effect (annualised)*** | ***0.32%*** | ***0.19%*** | ***0.05%*** | ***-0.24%*** | ***-0.32%*** | ***0.00%*** |

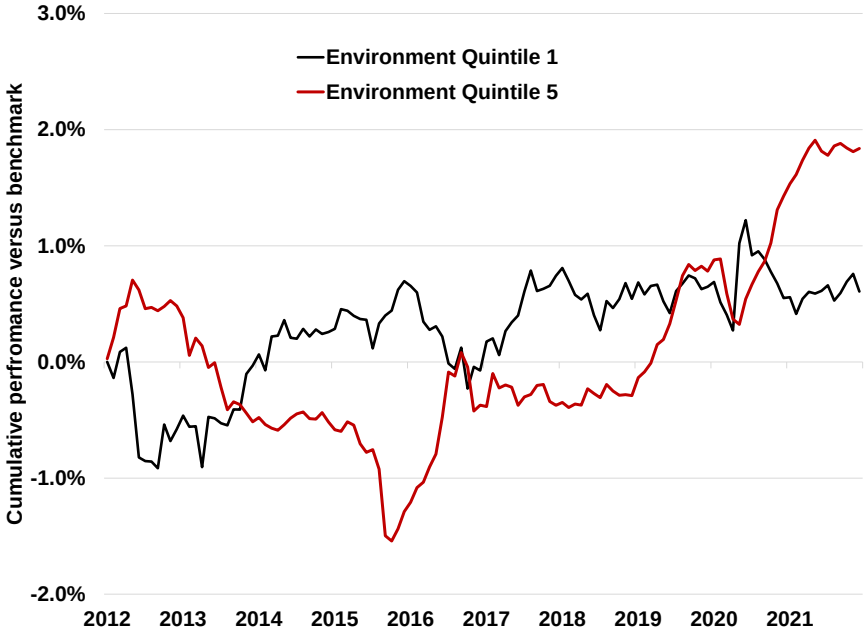
In Panel B of Table 4 we decompose this outperformance by sector-adjusting the performance of the quintiles. Concentrating on quintiles 1 and 5, we see that 0.32% of the outperformance of quintile 1 relative to the reference portfolio is due to sectoral differences, in particular, an average overweight to Financials of 23.9%. Conversely the sectoral exposures of quintile 5 account for -0.32% p.a. of the performance difference between this portfolio and the reference portfolio. In particular, quintile 5 has an average Financial sector underweight of 15.45%. Chart 5 shows the reference portfolio and sector-adjusted cumulative performances of quintile 1 and 5. When we take account of the sectoral differences between these two portfolios we see no clear pattern in the cumulative performance and, overall, sector-adjusted quintile 5 produces a higher cumulative performance.

Does this mean that focussing on the Environmental Rating does not produce the positive enhancement that proponents of ESG investing would like to see? Well, not necessarily. First, sector-unadjusted we see a clear outperformance of highly rated issuers, versus those with the lowest ratings. What our results show is that focussing exclusively on the Environmental

Rating in this way may lead to sectoral concentrations that, for other reasons, investor's may not see in their portfolios.

**Chart 5**

*Cumulative sector adjusted performance in excess of reference portfolio of Quintiles 1 and 5 formed using the Environmental Rating*




*Quintiles constructed using the Social Rating*

In Panel A of Table 5 we present the descriptive statistics of the quintile portfolios formed using Refinitiv's Social Rating. The issuers that made up quintile 1 had an average Social Rating of 92, compared to quintile 5 which had a Social rating of 47. Table 5 shows that quintile 1 produces the lowest average annualised return over the period, without a commensurately lower Sharpe Ratio.

Panel B of the Table indicates the source of the underperformance of quintile 1. Overall, the sectoral exposures, including an average underweight to Financials of 10.15% and an overweight to Healthcare of 7.36%, can account for 0.27% of the underperformance of quintile 1 relative to the reference portfolio. The sectoral effect for quintiles 3, 4 and 5 is very small, but for quintile 2 it boosts average return relative to the reference portfolio by 0.23% per annum. Chart 6 demonstrates the impact of controlling for these sectoral differences on quintiles 1 and 5. When we account for the sectoral differences between quintile 1 and the reference portfolio, we find that it produces a positive performance overall, while quintile 5

produces a negative, cumulated return. However, as the chart shows, from 2016 onwards quintile 5 outperforms the reference portfolio, while quintile 1 underperforms it in the latter months of the sample.

**Table 5**

*Forming quintile portfolios using Refinitiv's Social Rating: Descriptive Statistics*

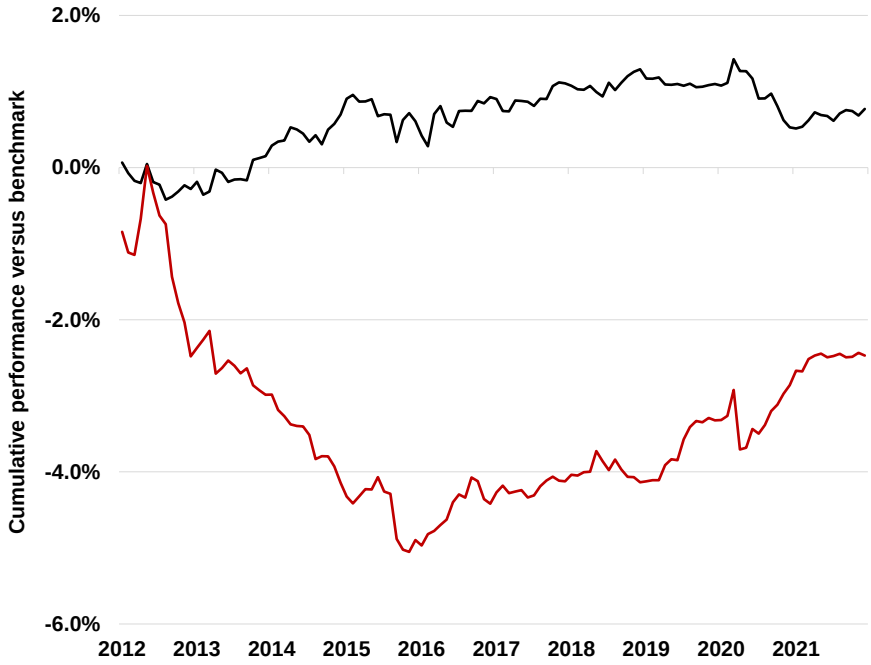
***Quintile 1=highest 5=lowest***

| **Panel A: Portfolio metrics** | **1** | **2** | **3** | **4** | **5** | **Reference portfolio** |
|---|---|---|---|---|---|---|
| Return (annualised) | 3.69% | 4.01% | 4.02% | 4.11% | 3.72% | 3.91% |
| Vol (annualised) | 3.82% | 4.29% | 3.94% | 4.06% | 3.86% | 3.95% |
| Sharpe | 0.97 | 0.93 | 1.02 | 1.01 | 0.96 | 0.99 |
| # Bonds | 273 | 269 | 265 | 280 | 314 | 1402 |
| % of Weight | 20% | 20% | 20% | 20% | 20% | 100% |
| Rating (AAA =1 to BBB=4) | 3.23 | 3.43 | 3.33 | 3.36 | 3.36 | 3.34 |
| Duration | 5.49 | 5.28 | 5.24 | 5.26 | 5.32 | 5.32 |
| Yield | 1.24% | 1.41% | 1.31% | 1.31% | 1.32% | 1.32% |
| Spread To Benchmark Curve | 125 | 144 | 134 | 134 | 134 | 134 |
| Factor Score | 92 | 85 | 79 | 70 | 47 | 75 |
| **Panel B: Sectoral exposures** | | | | | | |
| Basic Materials | 1.63% | -0.36% | -0.56% | -0.15% | -0.55% | 0.00% |
| Consumer Goods | -0.20% | -1.84% | -2.11% | -3.08% | 7.15% | 0.00% |
| Consumer Services | -1.58% | 1.08% | 1.18% | -0.73% | 0.07% | 0.00% |
| Financials | -10.15% | 5.64% | 3.41% | 3.07% | -1.88% | 0.00% |
| Health Care | 7.36% | -0.39% | -2.42% | -0.65% | -3.91% | 0.00% |
| Industrials | -2.06% | -3.74% | -0.21% | 4.13% | 1.92% | 0.00% |
| Oil & Gas | 1.66% | 4.36% | 0.73% | -2.57% | -4.18% | 0.00% |
| Technology | 3.64% | -0.75% | -1.87% | -1.09% | -0.02% | 0.00% |
| Telecommunications | 1.96% | -2.90% | 0.80% | -1.26% | 1.43% | 0.00% |
| Utilities | -2.25% | -1.09% | 1.05% | 2.35% | -0.02% | 0.00% |
| ***Return Effect (annualised)*** | ***-0.27%*** | ***0.23%*** | ***0.04%*** | ***0.02%*** | ***-0.02%*** | ***0.00%*** |

Overall, the results with regard to forming portfolios using the Social score are mixed. There is some evidence that focussing on the Social rating produces higher cumulated returns over time, but only when the portfolio's sectoral differences relative to the reference portfolio have been neutralised.

**Chart 6**

*Cumulative sector adjusted performance in excess of reference portfolio of Quintiles 1 and 5 formed using the Social Rating*




*Quintiles constructed using the Governance Rating*

We conclude this section of the paper by looking at the quintile portfolios formed using Refinitiv's Governance Rating. Arguably, responsible investors have always sought to invest in companies that are well governed, or if they are not, have demanded a premium by way of compensation for any deficiencies in governance. Because of this we might expect quintile rankings based upon Governance scores to have a relatively low impact on any performance differentials. Table 6 shows some evidence for this thesis. The differences between the performance of the quintiles and the reference portfolio are relatively small compared to quintiles formed using other criteria. Quintile 4 however, does have a significantly higher average return and the highest Sharpe Ratio. Overall then, despite the fact that quintile 1 has an average Governance rating of 89 compared to quintile 5's rating of 35, the Governance criteria has led to underperformance against the reference portfolio.

**Table 6**

*Forming quintile portfolios using Refinitiv's Governance Rating: Descriptive Statistics*

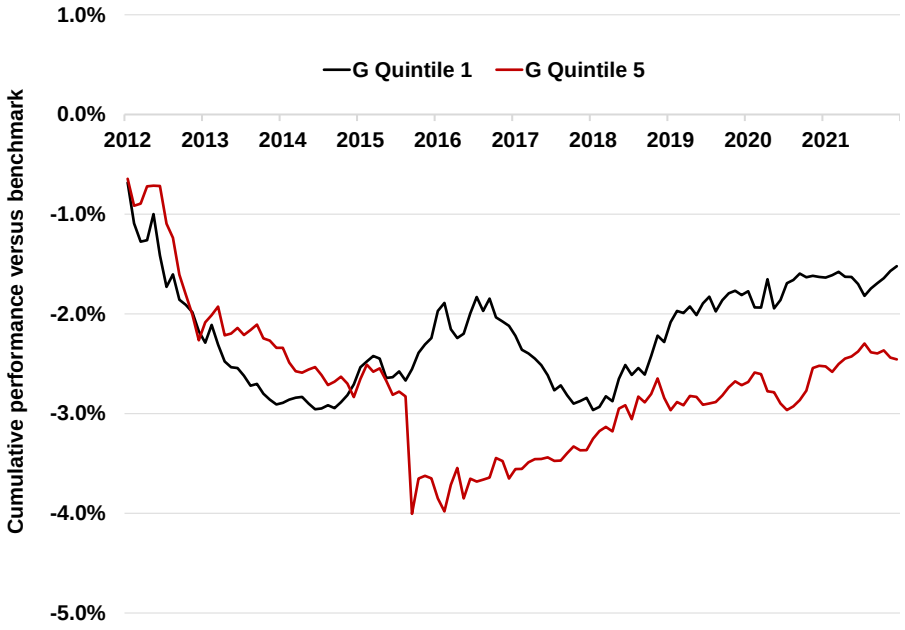
***Quintile 1=highest 5=lowest***

| **Panel A: Portfolio metrics** | **1** | **2** | **3** | **4** | **5** | **Reference portfolio** |
|---|---|---|---|---|---|---|
| Return (annualised) | 3.86% | 3.80% | 3.91% | 4.23% | 3.74% | 3.91% |
| Vol (annualised) | 4.02% | 3.98% | 3.95% | 3.94% | 4.02% | 3.95% |
| Sharpe | 0.96 | 0.96 | 0.99 | 1.07 | 0.93 | 0.99 |
| # Bonds | 261 | 269 | 292 | 286 | 294 | 1402 |
| % of Weight | 20% | 20% | 20% | 20% | 20% | 100% |
| Rating (AAA =1 to BBB=4) | 3.09 | 3.29 | 3.40 | 3.41 | 3.53 | 3.34 |
| Duration | 5.32 | 5.28 | 5.26 | 5.35 | 5.38 | 5.32 |
| Yield | 1.26% | 1.30% | 1.33% | 1.34% | 1.35% | 1.32% |
| Spread To Benchmark Curve | 129 | 133 | 137 | 136 | 137 | 134 |
| Factor Score | 89 | 80 | 70 | 56 | 35 | 66 |
| **Panel B: Sectoral exposures** | | | | | | |
| Basic Materials | 0.79% | 1.27% | 0.74% | -1.41% | -1.39% | 0.00% |
| Consumer Goods | -0.42% | -1.78% | -0.23% | -1.68% | 4.13% | 0.00% |
| Consumer Services | -2.70% | -2.36% | -0.38% | 3.03% | 2.44% | 0.00% |
| Financials | 13.29% | 0.43% | 0.23% | -0.31% | -13.79% | 0.00% |
| Health Care | -0.93% | 1.91% | 1.96% | -0.78% | -2.16% | 0.00% |
| Industrials | -2.83% | 1.17% | 0.13% | -1.50% | 3.07% | 0.00% |
| Oil & Gas | 3.62% | 4.41% | -0.87% | -2.86% | -4.31% | 0.00% |
| Technology | 1.40% | -1.01% | -1.51% | 0.18% | 0.94% | 0.00% |
| Telecommunications | -3.21% | -0.31% | 2.35% | -0.39% | 1.58% | 0.00% |
| Utilities | -9.01% | -3.71% | -2.42% | 5.72% | 9.49% | 0.00% |
| ***Return Effect (annualised)*** | ***0.06%*** | ***-0.05%*** | ***-0.02%*** | ***0.02%*** | ***0.00%*** | ***0.00%*** |

Panel B of Table 6 shows that the impact on the annualised return of sectoral over and underweights relative to the reference portfolio are also relatively modest. But it does show that Quintile 1 underperforms the reference portfolio, sector-adjusted, by 0.11% per year, while quintile 5 underperforms by 0.17% per year. Chart 7 shows the sectorally-adjusted performance relative to reference portfolio for quintiles 1 and 5.

**Chart 7**

*Cumulative sector adjusted performance in excess of reference portfolio of Quintiles 1 and 5 formed using the Governance Rating*




*Summary of quintile results*

The results in this section of the paper do indicate that portfolios comprising the higher ESG-ranked portfolios do outperform those comprising lower ESG ranked issuers when we sort on certain ESG rating criteria. Further analysis shows that some of the performance difference can be attributed to differences in sectoral exposures relative to the reference portfolio. This does not necessarily mean that we should discount the outperformance, instead, our results suggest that forming portfolios with high ESG ratings will often tend to produce sectoral exposures where the ESG ratings of these sectors are, on average, higher than in other sectors.

### 5.2 Portfolio tilt results

The quintile results provide a useful insight into the potential impact of ESG considerations on the risk and return characteristics of a corporate bond portfolio. However, few investors are likely to wish to confine their portfolio to just 20% of the available universe. They are more likely to tilt their portfolios towards and away from ESG criteria. To investigate this we

use both the MSCI and FTSE tilt methodologies. We begin by presenting the results of tilting our bond universe using the Composite ESG Rating and also, the E S and G Ratings.

*Main categories*

In Tables 7 and 8 we present the results for the overall ESG Rating and for the three main pillars of this rating, E, S and G. Table 7 presents the results using the MSCI methodology, while Table 8 presents the results from using the FTSE methodology.

Table 7 shows that tilting the portfolio using the composite ESG score or E,S or G scores makes a relatively small annualised return difference for all tilts, except the Environmental tilt. With regard to this tilt, the average return of the portfolio is boosted by 0.11% relative to the reference portfolio. The Environmental tilt improves the Environmental Rating of the portfolio by 7 points on average. We also find this outperformance relative to the reference portfolio to be significant at the 90% level of confidence. However, Panel B shows that the majority of this outperformance is related to the sector exposure differences, where, for example, there is an average overweight to Financials of 6.92%. These sectoral differences account for 0.10% of the 0.11% outperformance over the reference portfolio.

**Table 7**

*Tilting towards ESG Ratings using the MSCI methodology: Descriptive statistics*

| ***Panel A: MSCI Factor-Tilted Portfolios*** | **ESG Score** | **Environmental Pillar Score** | **Social Pillar Score** | **Governance Pillar Score** | **Reference portfolio** |
|---|---|---|---|---|---|
| Return (annualised) | 3.95% | 4.02% | 3.88% | 3.89% | 3.91% |
| Vol (annualised) | 3.89% | 3.96% | 3.94% | 3.96% | 3.95% |
| Sharpe | 1.01 | 1.01 | 0.99 | 0.98 | 0.99 |
| # Bonds | 1402 | 1402 | 1402 | 1402 | 1402 |
| % of Weight | 100% | 100% | 100% | 100% | 100% |
| Rating (AAA =1 to BBB=4) | 3.38 | 3.31 | 3.32 | 3.26 | 3.34 |
| Duration | 5.30 | 5.21 | 5.33 | 5.31 | 5.32 |
| Yield | 1.33% | 1.33% | 1.31% | 1.30% | 1.32% |
| Spread To Benchmark Curve | 135 | 137 | 133 | 132 | 134 |
| ESG Factor Score Improvement | +10 | +7 | +7 | +10 | |
| P-Value | 30.0% | 9.4% | 18.4% | 28.6% | |
| ***Panel B: Sector exposures*** | | | | | |
| Basic Materials | 0.73% | -0.15% | 0.21% | 0.61% | |
| Consumer Goods | -1.10% | -1.22% | -0.87% | -0.50% | |
| Consumer Services | -0.14% | -1.01% | -0.16% | -1.15% | |
| Financials | -1.28% | 6.92% | -0.76% | 3.49% | |
| Health Care | 0.02% | -0.67% | 1.53% | 0.32% | |
| Industrials | 1.63% | -0.71% | -0.99% | -0.65% | |
| Oil & Gas | 0.22% | 0.16% | 1.25% | 1.85% | |
| Technology | 0.13% | -0.59% | 0.60% | 0.07% | |
| Telecommunications | -1.53% | -2.11% | -0.27% | -0.72% | |
| Utilities | 1.31% | -0.61% | -0.55% | -3.32% | |
| ***Return Effect (annualised)*** | ***0.01%*** | ***0.10%*** | ***-0.02%*** | ***0.01%*** | |

Table 8 presents the tilting results for the four main ESG categories using the FTSE methodology. The results are very similar to those presented in Table 7. The Environmental tilt produces the most significant performance against the reference portfolio, but in this case all of the outperformance can be explained by the sectoral tilts.

**Table 8**

*Tilting towards ESG Ratings using the FTSE methodology: Descriptive statistics*

| ***FTSE Factor-Tilted Portfolios*** | **ESG Combined Score** | **Environmental Pillar Score** | **Social Pillar Score** | **Governance Pillar Score** | **Reference portfolio** |
|---|---|---|---|---|---|
| Return (annualised) | 3.93% | 4.01% | 3.90% | 3.91% | 3.91% |
| Vol (annualised) | 3.88% | 3.95% | 3.94% | 3.96% | 3.95% |
| Sharpe | 1.01 | 1.01 | 0.99 | 0.99 | 0.99 |
| # Bonds | 1402 | 1402 | 1402 | 1402 | 1402 |
| % of Weight | 100% | 100% | 100% | 100% | 100% |
| Rating (AAA =1 to BBB=4) | 3.38 | 3.31 | 3.32 | 3.27 | 3.34 |
| Duration | 5.29 | 5.22 | 5.33 | 5.31 | 5.32 |
| Yield | 1.32% | 1.33% | 1.31% | 1.30% | 1.32% |
| Spread To Benchmark Curve | 135 | 137 | 133 | 133 | 134 |
| ESG Factor Score Improvement | +10 | +8 | +8 | +11 | |
| P-Value | 39.5% | 11.5% | 37.6% | 45.6% | |
| ***Weight vs Benchmark*** | | | | | |
| Basic Materials | 0.79% | -0.12% | 0.19% | 0.62% | |
| Consumer Goods | -1.10% | -1.61% | -1.41% | -0.82% | |
| Consumer Services | -0.16% | -1.07% | -0.13% | -1.17% | |
| Financials | -2.28% | 6.40% | -0.25% | 3.79% | |
| Health Care | 0.17% | -0.51% | 1.42% | 0.52% | |
| Industrials | 1.97% | -0.79% | -0.88% | -0.73% | |
| Oil & Gas | 0.35% | 0.32% | 1.31% | 1.89% | |
| Technology | 0.13% | -0.53% | 0.45% | -0.06% | |
| Telecommunications | -1.41% | -1.73% | -0.30% | -0.61% | |
| Utilities | 1.56% | -0.38% | -0.40% | -3.43% | |
| ***Return Effect (annualised)*** | ***0.00%*** | ***0.10%*** | ***-0.01%*** | ***0.01%*** | |

*Sub-category Tilt results*

For some investors a tilt towards either a composite ESG rating or towards one of the main components of the composite score – E, S or G – might be all that they are looking for. But ESG rating firms provide scores for ten sub-category criteria. In Tables 9 and 10 we again tilt the portfolios according to ESG rating scores, but this time using the ten sub-category components of E, S and G.

The first row of Table 9 shows the annualised returns from the various tilts. The annualised return of the reference portfolio is 3.91%. The annualised returns of the tilted sub-category portfolios are clustered around the reference portfolio average and they range from 3.82% to

4.02% but we do not find these differences to be statistically significant. The Sharpe ratios are also tightly bunched around the Sharpe ratio of the reference portfolio.

Therefore the annualised returns of the sub-category tilt portfolios are not significantly different to the reference portfolio once we take sectoral differences into account. However, the last row of Panel A of Table 9 shows that all of the sub-category tilts produce a higher ESG composite and higher individual E, S and G scores with regard to each particular category.

Finally, the bottom row of Panel B in Table 9 shows that for most of the sub-category tilts sectoral differences can explain the difference in average annualised returns. For example, for the Emissions tilt, which produces the highest annualised return of 4.02%, 0.05% of this outperformance is due to sectoral differences between the tilted portfolio and the reference portfolio.

Table 10 provides the same results as presented in Table 9, but where the FTSE tilting methodology was used. The results are qualitatively identical to those presented in Table 9 and almost quantitatively identical. This result suggests that the choice of sub-category tilting methodology is not a crucial element of the methodology.

## Table 9

*Tilting towards the ESG Rating sub-components using the MSCI methodology: Descriptive statistics*

| | Environment | | | Social | | | Governance | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Panel A: Portfolio metrics*** | **Emissions Score** | **Environmental Innovation Score** | **Resource Use Score** | **Community Score** | **Human Rights Score** | **Product Responsibility Score** | **Workforce Score** | **CSR Strategy Score** | **Management Score** | **Shareholders Score** | **ESG Controversies Score** | **Reference portoflio** |
| Return (annualised) | 4.02% | 3.96% | 3.95% | 3.88% | 3.82% | 3.94% | 3.96% | 3.89% | 3.90% | 3.92% | 3.89% | 3.91% |
| Vol (annualised) | 3.96% | 3.96% | 3.96% | 3.91% | 3.90% | 3.99% | 3.95% | 3.93% | 3.95% | 3.96% | 3.87% | 3.95% |
| Sharpe | 1.02 | 1.00 | 1.00 | 0.99 | 0.98 | 0.99 | 1.00 | 0.99 | 0.99 | 0.99 | 1.00 | 0.99 |
| # Bonds | 1402 | 1402 | 1402 | 1402 | 1402 | 1402 | 1402 | 1402 | 1402 | 1402 | 1402 | 1402 |
| % of Weight | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| Rating (AAA =1 to BBB=4) | 3.34 | 3.31 | 3.33 | 3.31 | 3.31 | 3.36 | 3.34 | 3.29 | 3.27 | 3.33 | 3.43 | 3.34 |
| Duration | 5.26 | 5.21 | 5.31 | 5.32 | 5.30 | 5.42 | 5.30 | 5.34 | 5.30 | 5.31 | 5.26 | 5.32 |
| Yield | 1.33% | 1.32% | 1.32% | 1.29% | 1.28% | 1.33% | 1.32% | 1.29% | 1.30% | 1.30% | 1.33% | 1.32% |
| Spread To Benchmark Curve | 136 | 136 | 135 | 132 | 131 | 134 | 135 | 132 | 133 | 133 | 137 | 134 |
| ESG Factor Score Improvement | +8 | +14 | +7 | +12 | +12 | +13 | +7 | +10 | +13 | +16 | +21 | |
| ***Panel B: Sectoral exposures*** | | | | | | | | | | | | |
| Basic Materials | -0.13% | -0.33% | 0.13% | 0.44% | 0.29% | -0.17% | 0.27% | 0.53% | 0.52% | 0.13% | 0.64% | |
| Consumer Goods | -1.33% | -0.11% | -1.59% | -1.02% | 0.23% | -0.78% | -1.70% | -0.40% | -0.60% | -0.31% | -0.43% | |
| Consumer Services | -0.63% | -0.98% | -0.62% | -0.52% | 0.09% | 0.37% | -0.46% | -0.53% | -0.99% | -0.82% | 0.66% | |
| Financials | 2.68% | 6.97% | 0.81% | 1.64% | -1.03% | -4.67% | -0.02% | 0.00% | 3.44% | 2.50% | -1.70% | |
| Health Care | -0.31% | -2.39% | 0.46% | 1.91% | 0.63% | 1.51% | 0.52% | 0.58% | 0.21% | -0.12% | -0.78% | |
| Industrials | -0.28% | -0.92% | 0.66% | -0.64% | -0.59% | -0.54% | 0.40% | -1.22% | -0.73% | 0.11% | 2.94% | |
| Oil & Gas | 1.39% | -0.47% | 0.84% | 0.22% | 1.03% | 0.57% | 1.53% | 1.27% | 2.32% | -1.20% | -1.19% | |
| Technology | 0.19% | -0.85% | 0.59% | 0.63% | 0.18% | 0.55% | 0.36% | -0.11% | -0.14% | 0.63% | 0.19% | |
| Telecommunications | -1.68% | -1.79% | -0.03% | -0.34% | -0.54% | 1.66% | -1.34% | 0.19% | -1.11% | 1.91% | -2.02% | |
| Utilities | 0.08% | 0.85% | -1.24% | -2.30% | -0.28% | 1.49% | 0.43% | -0.29% | -2.91% | -2.84% | 1.68% | |
| ***Return Effect (annualised)*** | ***0.05%*** | ***0.08%*** | ***0.02%*** | ***0.00%*** | ***-0.05%*** | ***-0.05%*** | ***0.01%*** | ***0.01%*** | ***0.00%*** | ***0.01%*** | ***-0.01%*** | |

## Table 10

*Tilting towards the ESG Rating sub-components using the FTSE methodology: Descriptive statistics*

| | Environment | | | Social | | | Governance | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Panel A: Portfolio metrics*** | **Emissions Score** | **Environmental Innovation Score** | **Resource Use Score** | **Community Score** | **Human Rights Score** | **Product Responsibility Score** | **Workforce Score** | **CSR Strategy Score** | **Management Score** | **Shareholders Score** | **ESG Controversies Score** | **Reference portfolio** |
| Return (annualised) | 4.02% | 3.95% | 3.96% | 3.86% | 3.84% | 3.93% | 3.97% | 3.90% | 3.91% | 3.93% | 3.89% | 3.91% |
| Vol (annualised) | 3.94% | 3.96% | 3.95% | 3.91% | 3.90% | 4.00% | 3.95% | 3.92% | 3.95% | 3.98% | 3.86% | 3.95% |
| Sharpe | 1.02 | 1.00 | 1.00 | 0.99 | 0.99 | 0.98 | 1.01 | 0.99 | 0.99 | 0.99 | 1.01 | 0.99 |
| # Bonds | 1402 | 1402 | 1402 | 1402 | 1402 | 1402 | 1402 | 1402 | 1402 | 1402 | 1402 | 1402 |
| % of Weight | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| Rating (AAA =1 to BBB=4) | 3.34 | 3.30 | 3.33 | 3.31 | 3.31 | 3.36 | 3.34 | 3.29 | 3.27 | 3.32 | 3.44 | 3.34 |
| Duration | 5.25 | 5.22 | 5.31 | 5.32 | 5.30 | 5.43 | 5.29 | 5.34 | 5.31 | 5.32 | 5.25 | 5.32 |
| Yield | 1.33% | 1.32% | 1.32% | 1.29% | 1.28% | 1.33% | 1.32% | 1.29% | 1.30% | 1.31% | 1.33% | 1.32% |
| Spread To Benchmark Curve | 136 | 135 | 135 | 132 | 131 | 134 | 135 | 131 | 133 | 133 | 137 | 134 |
| ESG Factor Score Improvement | +9 | +16 | +8 | +13 | +14 | +15 | +8 | +11 | +14 | +17 | +25 | |
| P-Value | 5.6% | 26.1% | 12.4% | 18.3% | 4.8% | 33.8% | 12.2% | 36.1% | 46.7% | 34.6% | 40.6% | |
| ***Panel B: Sector exposures*** | | | | | | | | | | | | |
| Basic Materials | -0.08% | -0.47% | 0.13% | 0.47% | 0.31% | -0.09% | 0.30% | 0.46% | 0.57% | 0.27% | 0.71% | |
| Consumer Goods | -1.81% | -0.58% | -1.88% | -1.30% | -0.04% | -0.99% | -2.34% | -0.74% | -0.77% | -0.58% | -0.29% | |
| Consumer Services | -0.77% | -1.04% | -0.72% | -0.51% | 0.10% | 0.29% | -0.48% | -0.62% | -0.99% | -0.74% | 0.70% | |
| Financials | 2.95% | 7.37% | 1.16% | 1.52% | -0.66% | -5.13% | 0.51% | 0.00% | 3.46% | 2.92% | -2.63% | |
| Health Care | -0.23% | -2.65% | 0.55% | 2.00% | 0.70% | 1.64% | 0.55% | 0.66% | 0.41% | 0.07% | -0.82% | |
| Industrials | -0.17% | -1.26% | 0.61% | -0.53% | -0.71% | -0.69% | 0.36% | -1.18% | -0.74% | 0.16% | 3.36% | |
| Oil & Gas | 1.43% | -0.49% | 0.88% | 0.41% | 1.14% | 0.89% | 1.50% | 1.13% | 2.30% | -1.24% | -1.25% | |
| Technology | 0.20% | -0.72% | 0.57% | 0.64% | 0.17% | 0.52% | 0.35% | -0.10% | -0.19% | 0.69% | 0.18% | |
| Telecommunications | -1.67% | -0.96% | -0.07% | -0.34% | -0.67% | 1.85% | -1.34% | 0.22% | -1.00% | 1.55% | -2.06% | |
| Utilities | 0.16% | 0.81% | -1.23% | -2.35% | -0.33% | 1.72% | 0.58% | 0.17% | -3.04% | -3.08% | 2.09% | |
| ***Return Effect (annualised)*** | ***0.06%*** | ***0.09%*** | ***0.02%*** | ***0.00%*** | ***-0.04%*** | ***-0.05%*** | ***0.02%*** | ***0.02%*** | ***0.01%*** | ***0.01%*** | ***-0.01%*** | |

*Summary of tilting results*

The results in this section indicate that portfolios can be tilted towards a particular ESG characteristic to enhance the exposure to this characteristic, without having a material effect on the risk and return characteristics of the portfolios relative to the reference portfolio.

### 5.3 Exclusions

In the final part of this section of the paper we focus on the impact of excluding issuers from certain industrial sectors. This is an approach that some investors favour. Table 11 shows the results of creating portfolios by excluding sectors that some investors prefer not to invest in – Tobacco, Mining, Defence and Oil & Gas, plus the result of excluding all four. The results show that there is little impact on the performance of the portfolios when these sectors have been excluded. The average annualised returns are virtually identical, while the Sharpe Ratios are identical. The reason why there is so little difference between the risk and return characteristics of the portfolios and the reference portfolio is that there are relatively few issuers with a Refinitiv ESG rating from these sectors. This can be seen in the row entitled "% of weight" in Panel A of the Table. Tobacco accounts for only 1.1% of issuers in the reference portfolio, Defence only 0.2%, and so on. In total, all four sectors make up on average only 6.2% of the reference portfolio.

**Table 11**

*The impact of sector exclusions*

| | *Excluded sectors* | | | | | |
|---|---|---|---|---|---|---|
| **Panel A: Portfolio metrics** | **Ex Tobacco** | **Ex Mining** | **Ex Defence** | **Ex Oil & Gas Producers** | **Ex All Four Sectors** | **Reference portfolio** |
| Return (annualised) | 3.91% | 3.91% | 3.90% | 3.91% | 3.91% | 3.91% |
| Vol (annualised) | 3.94% | 3.94% | 3.95% | 3.95% | 3.93% | 3.95% |
| Sharpe | 0.99 | 0.99 | 0.99 | 0.99 | 0.99 | 0.99 |
| # Bonds | 1384 | 1394 | 1398 | 1345 | 1314 | 1402 |
| % of Weight | 98.9% | 99.4% | 99.8% | 95.6% | 93.8% | 100% |
| Rating (AAA =1 to BBB=4) | 3.34 | 3.34 | 3.34 | 3.37 | 3.37 | 3.34 |
| Duration | 5.31 | 5.32 | 5.32 | 5.30 | 5.28 | 5.32 |
| Yield | 1.32% | 1.31% | 1.32% | 1.32% | 1.32% | 1.32% |
| Spread To Benchmark Curve | 134 | 134 | 134 | 135 | 135 | 134 |
| **Panel B: Sector exposures** | | | | | | |
| Basic Materials | 0.03% | -0.55% | 0.01% | 0.13% | -0.42% | 0.00% |
| Consumer Goods | -0.94% | 0.07% | 0.02% | 0.58% | -0.30% | 0.00% |
| Consumer Services | 0.04% | 0.02% | 0.01% | 0.18% | 0.27% | 0.00% |
| Financials | 0.43% | 0.23% | 0.09% | 1.82% | 2.64% | 0.00% |
| Health Care | 0.06% | 0.03% | 0.01% | 0.24% | 0.35% | 0.00% |
| Industrials | 0.09% | 0.05% | -0.19% | 0.40% | 0.35% | 0.00% |
| Oil & Gas | 0.05% | 0.03% | 0.01% | -4.39% | -4.38% | 0.00% |
| Technology | 0.03% | 0.01% | 0.00% | 0.11% | 0.16% | 0.00% |
| Telecommunications | 0.10% | 0.06% | 0.02% | 0.43% | 0.63% | 0.00% |
| Utilities | 0.11% | 0.06% | 0.02% | 0.48% | 0.70% | 0.00% |
| ***Return Effect (annualised)*** | ***0.01%*** | ***0.00%*** | ***0.00%*** | ***0.00%*** | ***0.01%*** | ***0.00%*** |

*Exclusions summary*

The results generated by excluding certain industry sectors show that these exclusions made little difference to portfolio performance. This means that over our sample period investors could have excluded these sectors from portfolios, aligning their portfolios with their ESG views, with little impact on performance.

## 6. Focus on downside risk

One of the supposed advantages of integrating ESG considerations into a portfolio is that it has a positive impact on tail risk. That is, a well governed company that tries to reduce any negative externalities from its activities, is less likely to experience left tail outcomes. In this regard, Carillion plc is a good example of how poor governance can lead to losses for investors. It is now widely accepted that the company was poorly governed and, as a result of this, it failed. Though not all corporate shocks end in the failure of the company, investor portfolios can still experience losses.

To test the hypothesis that tail risks are lower when ESG considerations are integral to portfolio construction we present a range of risk metrics that focus on the measurement of tail risk. Table 12 presents tail risk statistics for the tilted portfolios described earlier as well as for the Reference portfolio. In the Table we present a worst month statistic, the VaR 95 and Conditional Var 95 for each portfolio, a measure of downside deviation and the portfolio's Sortino ratio. In the interests of brevity we focus our discussion on the Sortino ratios. This performance statistic is calculated by dividing the average excess return of the portfolio by the downside deviation of its returns, that is, the standard deviation of only the negative monthly returns. A higher Sortino ratio portfolio has a higher excess return for given downside risk.

In Panel A of the Table the results indicate a marginal improvement in the downside characteristics of the portfolio tilted using the ESG Composite score when we use the MSCI methodology. The Sortino ratio of this portfolio is 1.11 compared to the Sortino ratio of the Reference portfolio of 1.05. The Sortino ratio of the equivalent portfolios created by tilting using the Environmental and Social Ratings is also higher than the reference portfolio. However, there is no improvement when the portfolio is formed using the Governance Ratings. Panel B of Table 12 presents results comparable to those in Panel A but where we use the FTSE tilting methodology. Interestingly the portfolio ranked by the composite ESG rating produces a Sortino ratio that is identical to that of the reference portfolio. However, the tilted portfolios created using the Environmental and Social Ratings have higher Sortino ratios than those of the Reference portfolio. Arguably the most consistent result in Table 12 relate to the portfolio tilted to the Environmental Rating. The results for this tilt appear to be robust to the tilting methodology used.

**Table 12**

*Downside risk characteristics for tilted portfolios*

| Panel A: MSCI Tilt | ESG | Env | Soc | Gov | Reference portfolio |
|---|---|---|---|---|---|
| **Worst month** | -6.87% | -7.12% | -7.02% | -7.20% | **-7.11%** |
| **VaR 95** | -0.87% | -0.86% | -0.87% | -0.89% | **-0.87%** |
| **Con VaR** | -2.38% | -2.39% | -2.43% | -2.43% | **-2.43%** |
| **DS Deviation** | 3.62% | 3.73% | 3.71% | 3.78% | **3.80%** |
| **Sortino** | 1.11 | 1.10 | 1.07 | 1.05 | **1.05** |
| **Panel B: FTSE Tilt** | | | | | |
| **Worst month** | -7.11% | -6.83% | -7.09% | -7.02% | |
| **VaR 95** | -0.87% | -0.87% | -0.87% | -0.88% | |
| **Con VaR** | -2.43% | -2.37% | -2.39% | -2.42% | |
| **DS Deviation** | 3.80% | 3.60% | 3.72% | 3.70% | |
| **Sortino** | 1.05 | 1.11 | 1.10 | 1.07 | |

In Table 13 we present results analogous to those presented in Table 12, but for the quintile portfolios. There are number of points worth noting in Table 12. First, quintile 1 formed using the composite ESG Rating produces the highest Sortino ratio (1.23) of any portfolio. This is substantially higher than the Sortino ratio for the equivalent quintile 5 portfolio (0.97) and also than for the Reference portfolio (1.05). Second, generally there is a decline in Sortino ratios as we move from quintiles 1 and 2 to towards quintile 5. Third, the results with regard to the quintiles created using the Governance ranking are the exception to this general conclusion. Both quintiles 1 (0.99) and 2 (1.01) produce lower Sortino ratios than the reference portfolio, while quintile 4 (1.17) produces the highest ratio.

**Table 13**

*Downside risk characteristics for quintile portfolios*

| ESG | Q1 | Q2 | Q3 | Q4 | Q5 | Reference portfolio |
|---|---|---|---|---|---|---|
| **Worst month** | -6.55% | -6.62% | -6.94% | -7.76% | -7.69% | **-7.11%** |
| **VaR 95** | -0.89% | -0.90% | -0.96% | -0.83% | -1.05% | **-0.87%** |
| **Con VaR 95** | -2.34% | -2.32% | -2.40% | -2.63% | -2.60% | **-2.43%** |
| **DS Deviation** | 3.51% | 3.52% | 3.76% | 4.15% | 4.15% | **3.80%** |
| **Sortino** | 1.23 | 1.06 | 1.04 | 0.95 | 0.97 | **1.05** |
| **Environment** | | | | | | |
| **Worst month** | -7.46% | -6.90% | -7.04% | -6.80% | -7.36% | |
| **VaR 95** | -0.85% | -0.78% | -1.05% | -1.12% | -1.17% | |
| **Con VaR 95** | -2.46% | -2.17% | -2.48% | -2.55% | -2.65% | |
| **DS Deviation** | 3.98% | 3.58% | 3.87% | 3.69% | 3.97% | |
| **Sortino** | 1.10 | 1.16 | 1.03 | 0.96 | 0.95 | |
| **Social** | | | | | | |
| **Worst month** | -6.47% | -7.64% | -7.03% | -7.25% | -7.16% | |
| **VaR 95** | -0.97% | -0.93% | -0.90% | -0.87% | -0.91% | |
| **Con VaR 95** | -2.37% | -2.62% | -2.39% | -2.42% | -2.53% | |
| **DS Deviation** | 3.50% | 4.06% | 3.72% | 3.81% | 3.91% | |
| **Sortino** | 1.07 | 1.01 | 1.10 | 1.10 | 0.97 | |
| **Governance** | | | | | | |
| **Worst month** | -7.43% | -7.36% | -6.90% | -6.72% | -7.15% | |
| **VaR 95** | -0.99% | -0.94% | -0.94% | -0.90% | -0.95% | |
| **Con VaR 95** | -2.51% | -2.45% | -2.39% | -2.41% | -2.64% | |
| **DS Deviation** | 3.97% | 3.85% | 3.61% | 3.68% | 3.89% | |
| **Sortino** | 0.99 | 1.01 | 1.10 | 1.17 | 0.98 | |

It is difficult to draw definite conclusions from Tables 12 and 13 with regard to the relationship between ESG ratings and downside risks in a corporate bond portfolio. However, arguably these results show that ranking using the ESG composite or Environmental rating generally leads to a diminution in downside risk.

## 7. Conclusions

The aim of this paper was to investigate the possible impact of integrating ESG considerations into the construction of a fixed income portfolio. To this end we collated a comprehensive fixed income dataset comprising prices, yields, spreads, returns and other detailed bond characteristic information. We combined this fixed income data with ESG ratings of the underlying bond issuers. Using this rich combined dataset we were able to construct portfolios according to a range of ESG ratings. The purpose of this was to establish whether there was an "ESG effect". The related results indicate that portfolios comprising higher ESG-ranked portfolios outperform those comprising lower ESG ranked issuers when we sort on

certain ESG rating criteria although part of the difference in returns could be attributed to the fact that different ESG ranked portfolios had different sectoral exposures.

However, for those investors that would not wish to invest in a portfolio consisting of the top ESG-ranked issuers we investigated a second approach where we created portfolios that were tilted towards positive ESG characteristics and away from less positive characteristics using two industry-standard tilting methodologies. The results indicated that portfolios can be tilted towards a particular ESG characteristic to enhance the exposure to this characteristic (tilting towards an ESG characteristic by definition means enhancing exposure to that characteristic so this does not need to be said), without having a material effect on the risk and return characteristics of the portfolios relative to the reference portfolio.

We also investigated the impact of excluding issuers from four sectors that some investors choose to exclude from their portfolios - Tobacco, Mining, Defence and Oil & Gas. We found that these exclusions had little impact on portfolio performance, mainly because issuers from these sectors made up only a small proportion of the sample of issuers. Finally, we investigated the idea that issuers with high relative ESG scores would tend to experience fewer bad outcomes, arguably because their overall governance ensures that such events are less likely. Our results showed some indication of a diminution of downside risk in portfolios comprising issuers with higher ESG ratings, but these results were not definitive with regard to this issue.

As more and more investors seek to enhance the ESG credentials of their investment portfolios, our work adds to this important research area. We have shown, at a minimum, that enhancing the ESG profile of a fixed income portfolio has not led to any deterioration in the risk-adjusted performance of fixed income portfolios. Given this, investors could feel confident that integrating ESG considerations could be a worthwhile exercise.

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