



SMART SRI CORPORATE BOND INVESTING: COMBINING ESG CRITERIA WITH FACTOR INVESTING IN FIXED INCOME

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1. INTRODUCTION

Both Sustainable & Responsible Investing (SRI) and Factor Investing are increasingly gaining the investor's attention. Sustainable & Responsible Investing integrates longer-term business opportunities and risks, which, hence, are relevant factors to integrate into the portfolio. By exploiting some behavioural biases or structural market segmentations, Factor Investing leads to superior risk-adjusted returns. Although Factor Investing has not been very common in the corporate bond market, an increasing number of academic studies indicate its value in the Fixed Income space. This paper proposes a portfolio construction methodology that combines both elements. Firstly, Candriam's SRI methodology will be described and its effect on the portfolio shown. Secondly, a 2-step portfolio construction methodology will be outlined: a fundamental weighting of the eligible issuers, and the implementation of factor tilts. The effect and added value of each of these steps will be illustrated. Thirdly, the different steps are combined in one portfolio that will turn out to have superior risk-adjusted returns. The last section concludes and additionally illustrates the out-of-sample performance of this index methodology. Across this document, the proposed index methodology will always be applied to the EUR and USD corporate bond market to test its robustness and avoid any over-fitting. All simulations start in February 2006 and end in December 2015. The out-of-sample return characteristics since the start of 2016 are shown in the last section.

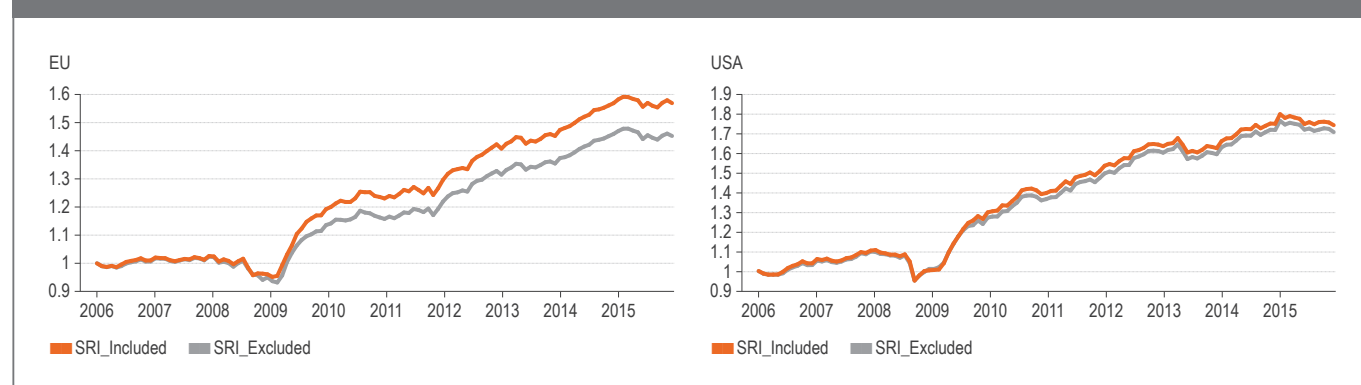
2. SRI INVESTING

Candriam's SRI methodology ranks companies per sector and per geographical region (Europe, Asia Pacific and North America) based on Micro and Macro analyses. The Micro Analysis procedure assesses the company's management of customers, employees, the environment, suppliers, investors and the broad society. The Macro Analysis procedure measures the company's exposure to global sustainability trends such as climate change, resource depletion, developing economies, demographic evolutions, health & wellness and interconnectivity. The results of the Macro and Micro analyses are combined and the companies ranked per sector. The eligible companies are composed of the Top 70% of businesses within their sector in the respective universe. Additionally, a norms-based analysis based on an assessment of how companies comply with the ten principles of the United Nations Global Compact and a verification of controversial activities such as armaments, gambling, tobacco and nuclear activity will eliminate other companies. More information on Candriam's SRI methodology can be found on www.candriam.com

To assess the financial impact of the SRI screening, SRI universe returns are compared with non-SRI universe returns (all portfolios are equally weighted and rebalanced on a monthly basis). The graphs below illustrate that the average return of the SRI companies exceeds that of the non-SRI companies. The graphs show the performance in absolute return and in excess return versus duration-matched government bonds.

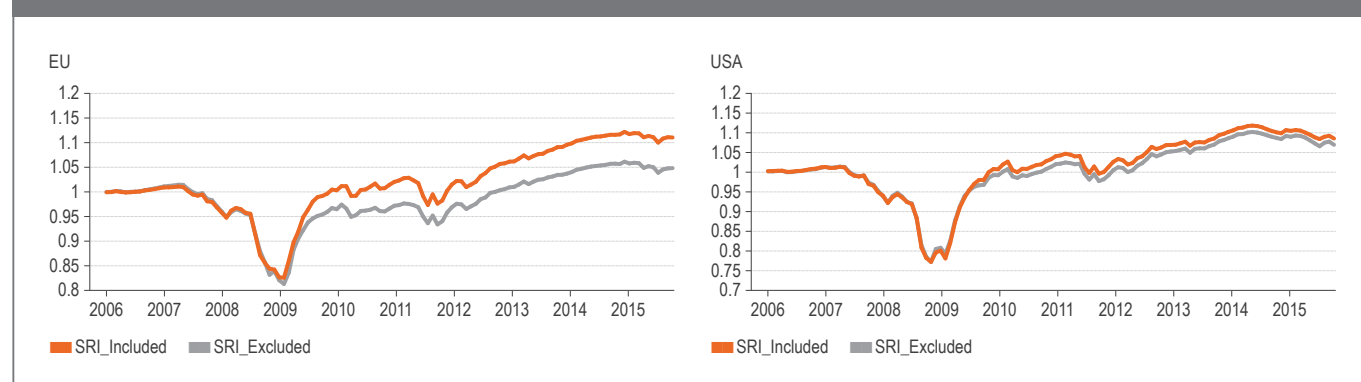
This SRI universe is the starting point for the portfolio construction algorithm, which determines the weightings of these bonds. Non-SRI companies are not eligible for the portfolio.

FIGURE 1: Candriam SRI Universe – Cumulative Return



Sources: Candriam, BofAML, Factset

FIGURE 2: Candriam SRI Universe – Excess Return vs Treasuries



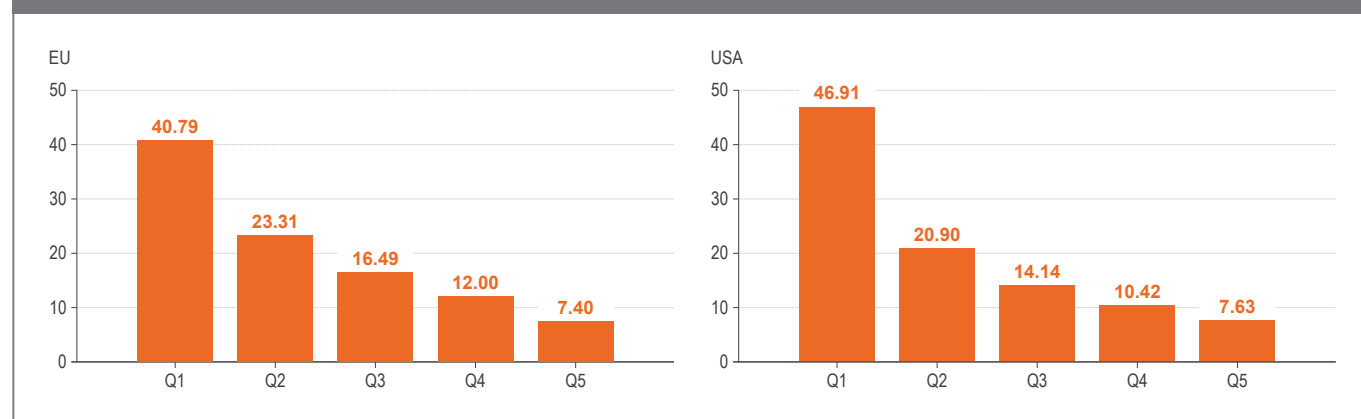
Sources: Candriam, BofAML, Factset

3. PORTFOLIO CONSTRUCTION

Most commonly used bond indices are based on outstanding debt amounts and their market price. These so-called market capitalization indices have important disadvantages. The more a company issues debt, the higher the allocation in such an index! Obviously, this leads to high proportions of highly indebted sectors. Additionally, the duration of the market capitalization index is entirely driven by debt issuers. The lower the yields, the longer the average maturity borrowers would prefer. But from an investor's point of view, the opposite is preferred. Hence one can intuitively feel that market capitalization indices are sub-optimal, even more than the equivalent market capitalization equity indices.

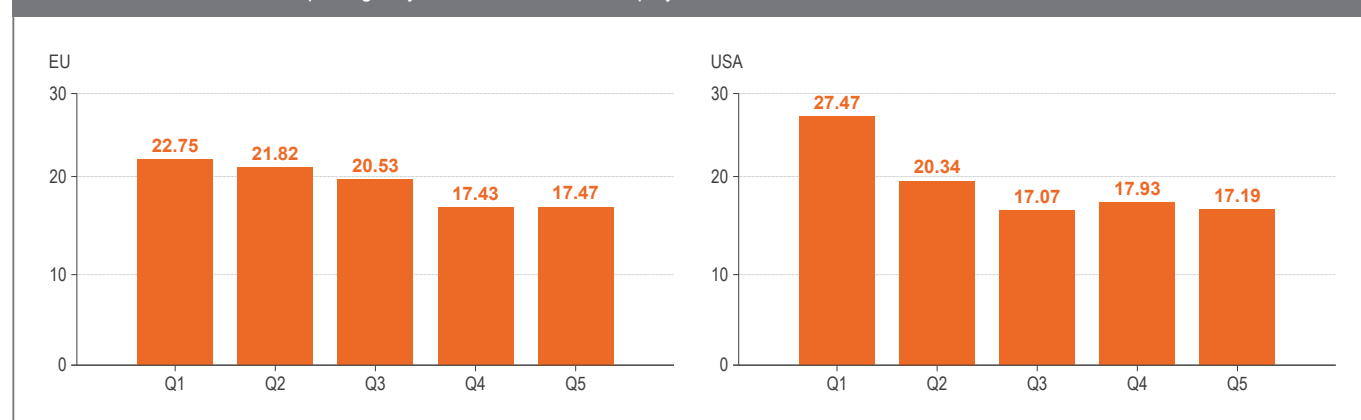
These disadvantages are illustrated by the graphs below. The graphs show that large debtors take up an important part of the index. Additionally, highly indebted companies are overrepresented in market capitalization bond indices.

FIGURE 3: Sum of MarketCap Weights by Quintile



Sources: Candriam, BofAML, Bloomberg

FIGURE 4: Sum of Market Cap Weight by Total Debt/Common Equity Quintile



Sources: Candriam, Bloomberg

As an alternative, in this document individual bond weightings are determined via a 2-step process. First, a fundamental weighting for the issuer is determined that reflects the importance of the company based on common economic measures. Bond weightings are then tilted to reflect Value, Low Volatility, Size and Momentum factors. Below, we outline each of these steps, illustrating their impact on risks and returns.

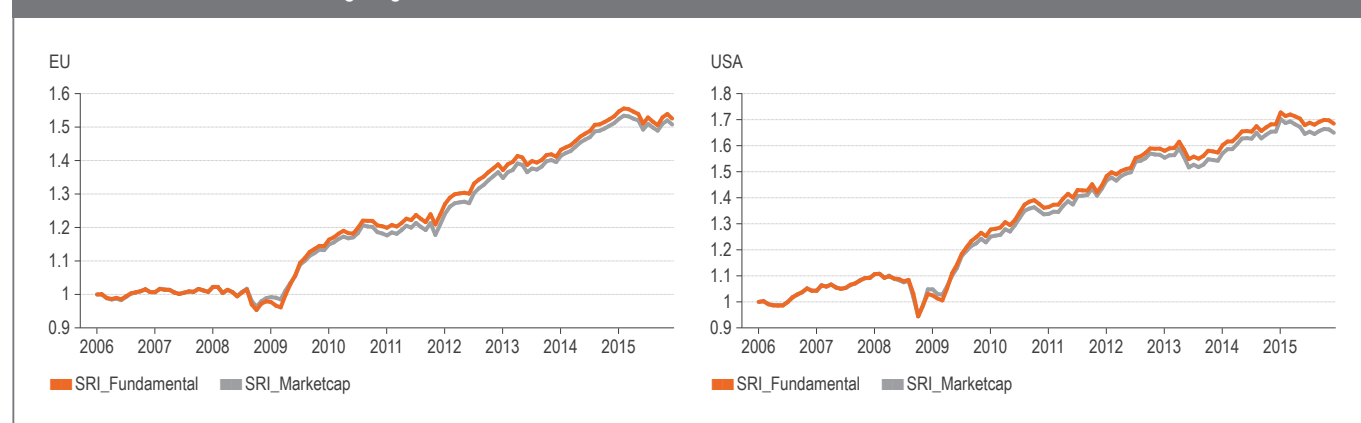
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3.1 Fundamental Weighting

A company's importance within the economy can be measured in many different ways. Candriam believes that elements of the balance sheet, income statement and cash flow statement should be integrated to have a meaningful assessment of the size of a company. Hence the equally weighted average of the size of the balance sheet, the total revenue, total income and cash flow generation are taken to determine a fair initial weighting for all companies.

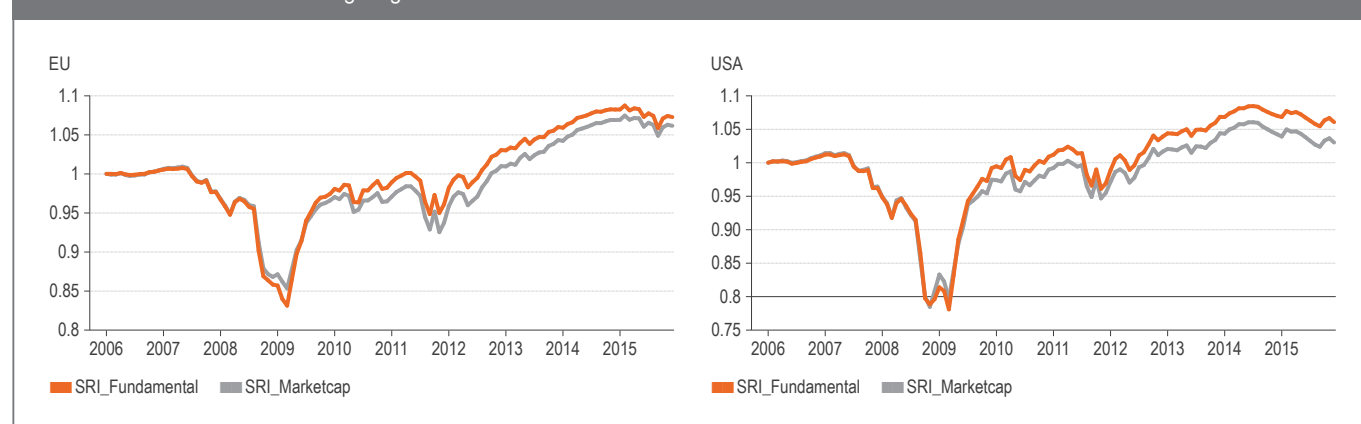
In order to guarantee a sufficient level of liquidity and to avoid too concentrated a weighting on a unique bond from an Issuer with a high Fundamental Weighting, the number of bonds per issuer is capped at 10 and each Bond weighting is capped at 0.50% and the overall portfolio weighting then scaled to 100%. The graphs below show the performance of this methodology in absolute return and in excess return versus duration-matched government bonds.

FIGURE 5: SRI Fundamental Weighting – Cumulative Return



Sources: Candriam, BofAML

FIGURE 6: SRI Fundamental Weighting – Excess Return vs Treasuries



Sources: Candriam, BofAML

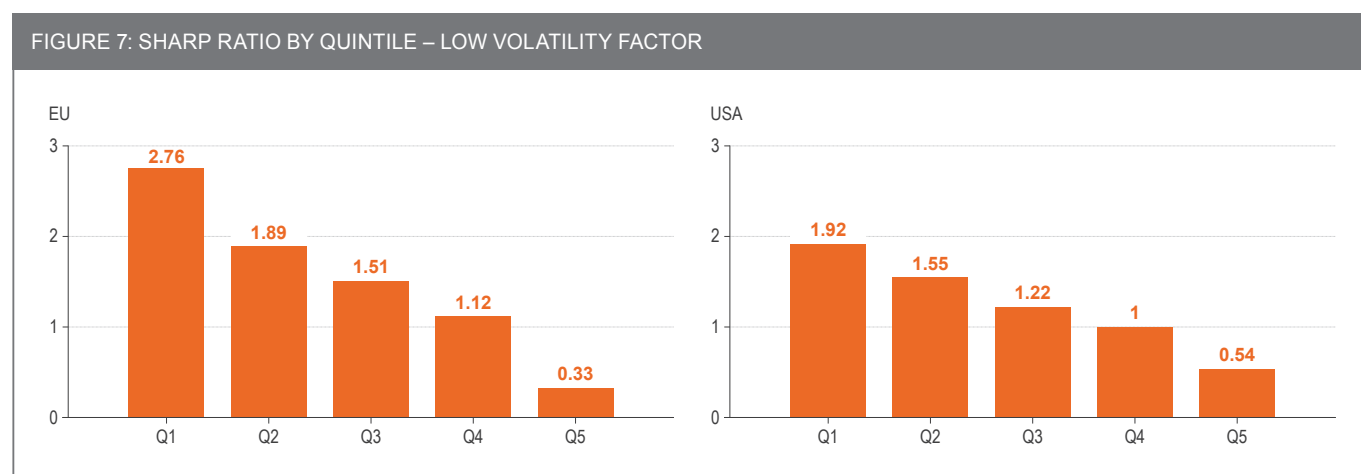
3.2 Factor Investing

Factor investing (sometimes called Smart Beta) has gained in popularity in recent years. In essence, the technique is not new. Fama and French laid the foundations for factor investing in stock markets already in 1993. But it gained in popularity when Low Volatility was “discovered” by Haugen and Baker in 2012. They provided evidence that investing in low-volatility stocks yielded superior risk-adjusted returns, contrary to conventional wisdom. Candriam has already discussed this so-called anomaly in a previous paper, where we combined it with Quality screening (Van de Maele and Jallet 2015). Although most research covers the equity markets, smart beta within corporate bond investing is starting to gain traction. Especially the paper of Houweling and van Zundert in the Financial Analyst Journal (Second Quarter 2017) described relevant factors for corporate bond investing.

Most existing Smart Beta portfolios are based on one single factor (either Value, Quality, Momentum, Low Volatility or Size). However, real diversification benefits exist when different factors are combined in one portfolio. In this analysis, we combine Value, Low Volatility, Size and Momentum.

The table below indicates the measures used to define Value, Low Volatility, Size and Momentum.

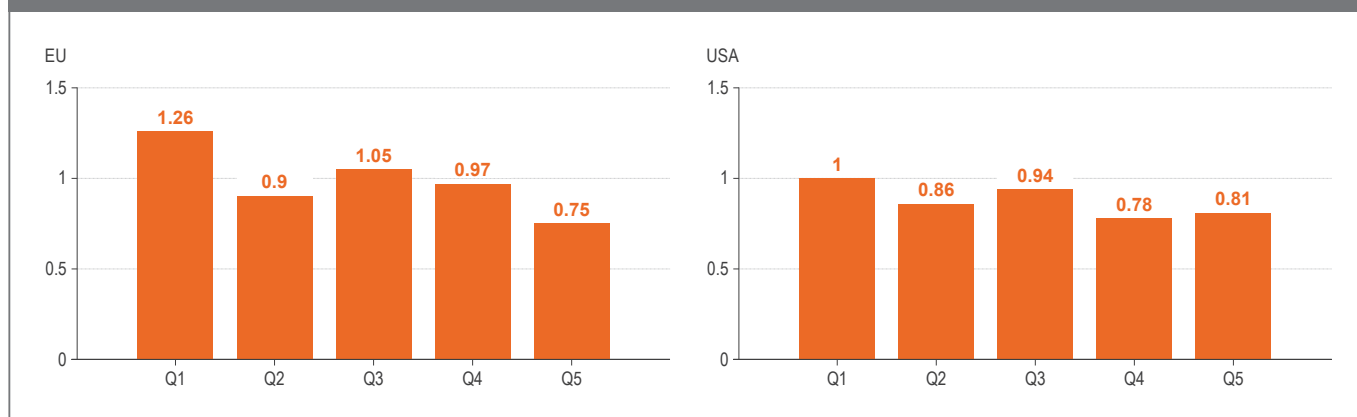
- Low Volatility: DTS, Duration * Spread
- Size: Aggregate Market Debt of the Issuer
- Momentum: Past 6 Months Credit Spread return (Excess return versus duration-matched government bonds)
- Value: Fair value of the OAS, calculated with a cross-sectional regression based on Time to Maturity, Rating and 3M Spread Change



Sources: Candriam, Bloomberg, Factset

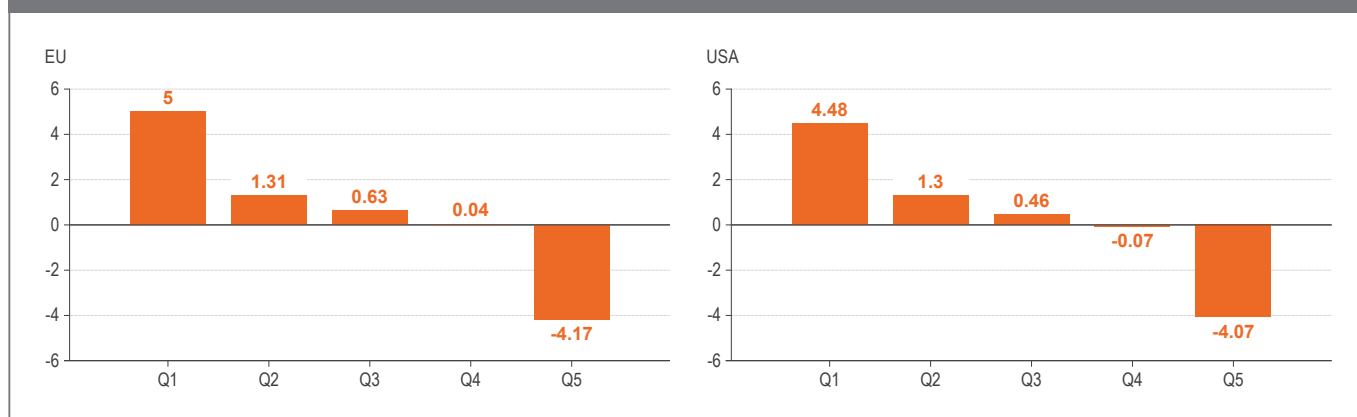
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FIGURE 8: Sharpe Ratio by Quintile – Size Factor



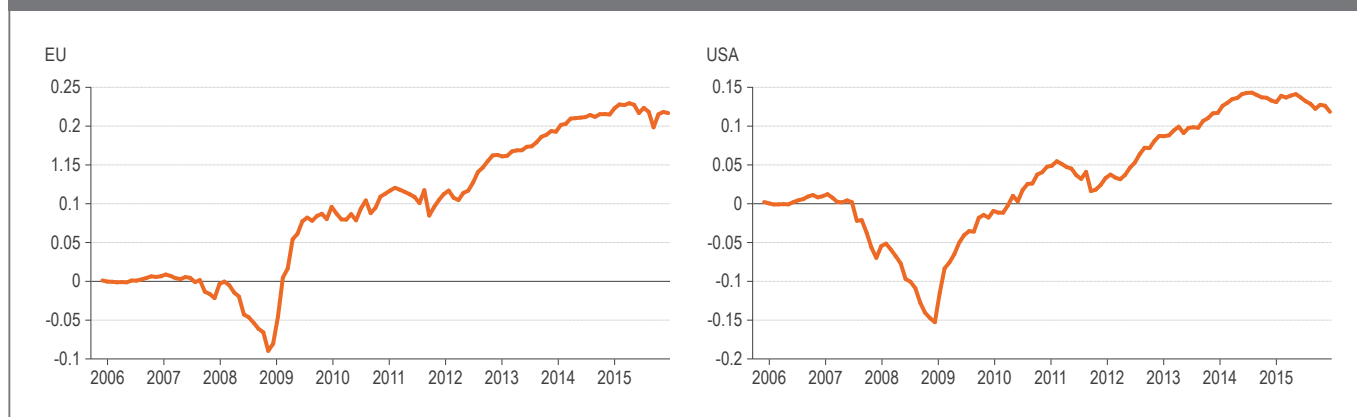
Sources: Candriam, Bloomberg, Factset

FIGURE 9: Annualized Credit Excess Returns by Quintile – Momentum Factor



Sources: Candriam, Bloomberg, Factset

FIGURE 10: Long/short Cumulative Credit Excess Return – Value Factor



Sources: Candriam, Bloomberg, Factset

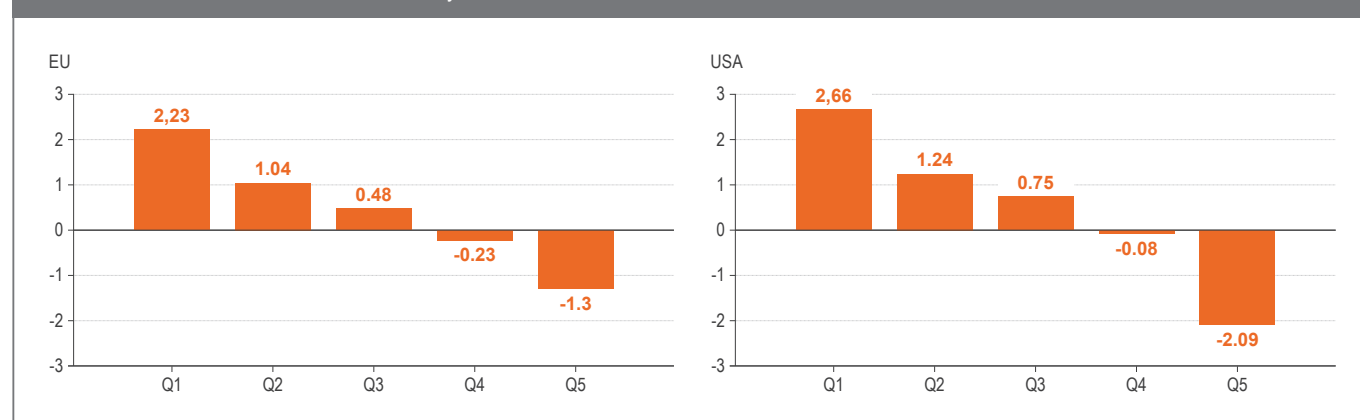
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To illustrate the added value of the aforementioned four factors, portfolios were created for each of the individual factors. These portfolios were created by ranking each bond within its universe at factor level. Bonds were then classified in quintiles, with the Q1 portfolios invested in the first quintile and the Q5 portfolios in the last quintile (with an equal bond weighting in each quintile).

Regarding Low Volatility and Size Factors, we can observe a decreasing Sharpe Ratio in function of the Quintile, top-ranked Bonds get a higher Sharpe Ratio. The Momentum Factor plot shows the Annualized Credit Excess Returns by Quintile, and the Value Factor the Long/Short Cumulative Credit Excess returns vs Treasuries.

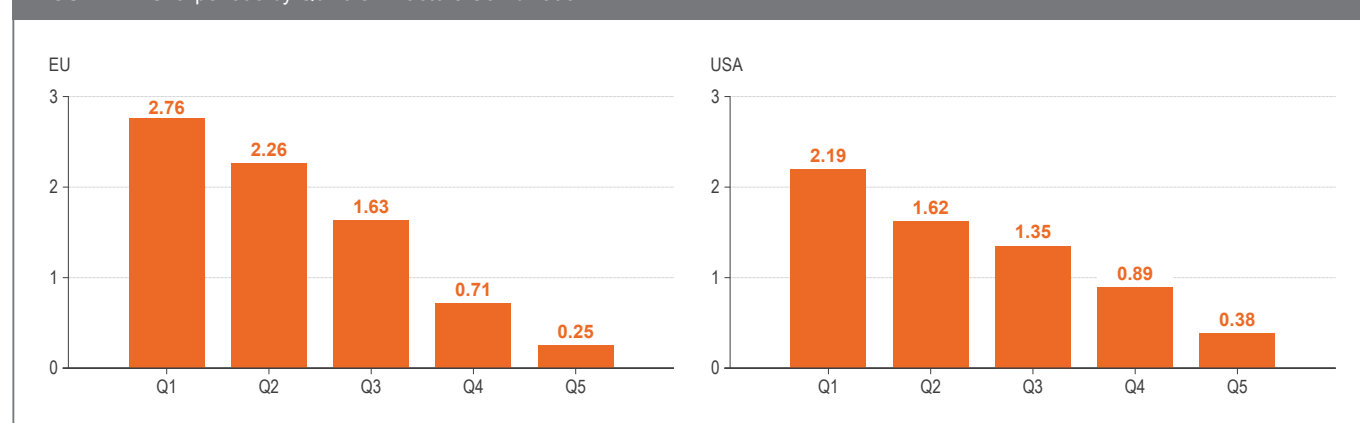
Subsequently, the combination of the factors is calculated. It turns out that the multi-factor approach undeniably adds value in all regions, with both Annual Excess Returns and Sharpe Ratios declining in accordance with the Quintile.

FIGURE 11: Annual Credit Excess Returns by Quintile – Factors Combination



Sources: Candriam, Bloomberg, Factset

FIGURE 12: Sharpe ratio by Quintile – Factors Combination



Sources: Candriam, Bloomberg, Factset

4. PUTTING IT ALL TOGETHER

TABLE 1: Composite Quintile / Drift

1	2	3	4	5
+10bps	+5bps	Neutral	- 5bps	- 10bps

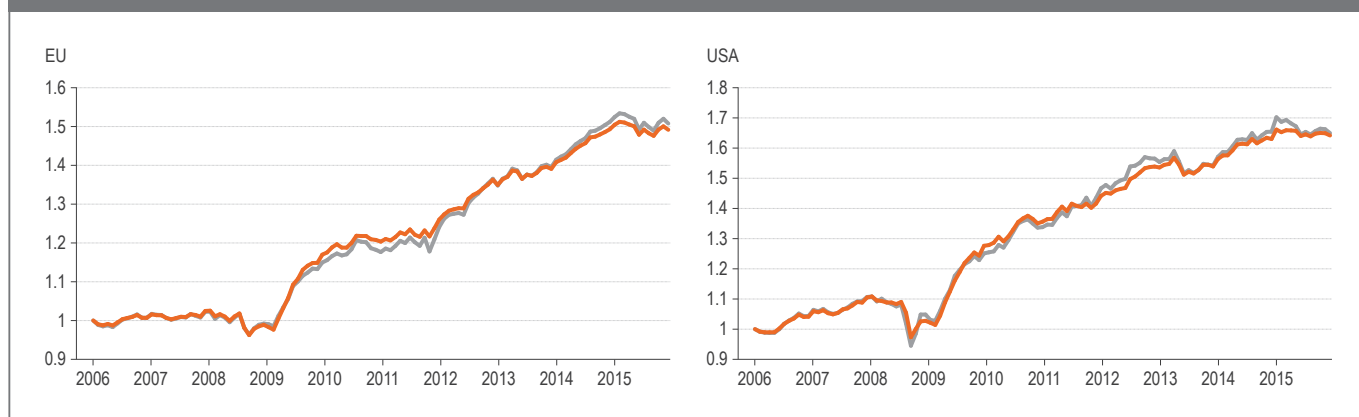
Source:

The last step in the portfolio construction process involves putting all these steps together. In essence, the factor tilts need to be applied to the fundamental weightings. In order to do so, the following drifts are applied by quintile to the fundamental weightings and then rebased to 100%.

4.1 Historical Performance

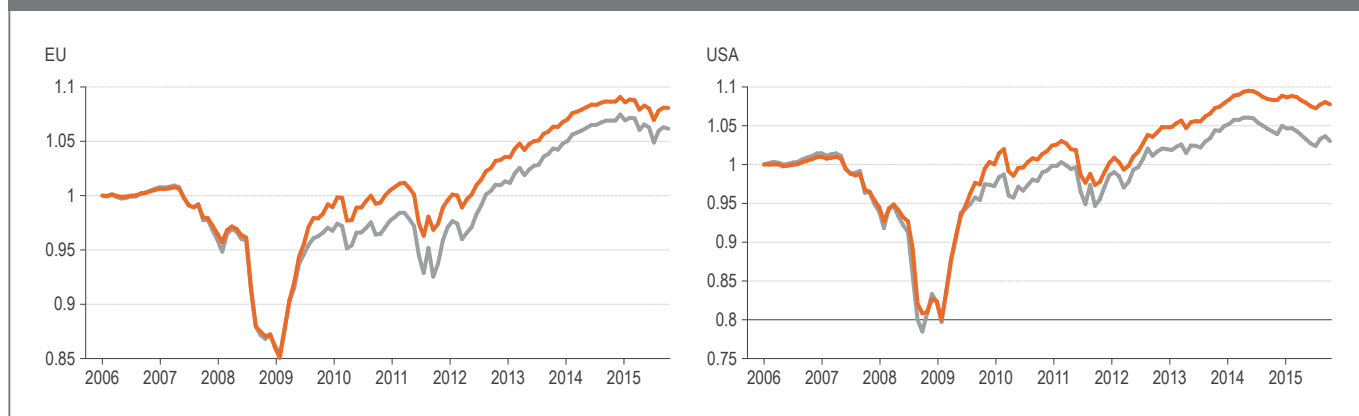
The graphs and table below illustrate the performance of the combined methodology. Although the total return slightly lags the market-capitalization index due to a lower overall duration exposure, the excess return versus duration-matched government bonds is substantially positive. Also, the Sharpe ratio and Historical VaR are better than the market-capitalization index.

FIGURE 13: Candriam SRI Index vs Market cap Universe – Cumulative Return



Sources: Candriam, BofAML

FIGURE 14: Candriam SRI Index vs Market cap Universe – Excess Return vs Treasuries



Sources: Candriam, BofAML

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TABLE 2: SRI Indices – Statistical Returns Table

	Candriam SRI Index (EUR figures)	Market Cap Universe (EUR figures)	Candriam SRI Index (USA figures)	Market Cap Universe (USA figures)
Annualized Return	4.15%	4.26%	5.17%	5.19%
Annualized Return vs Treasuries	0.79%	0.62%	0.76%	0.28%
Annualized Std Dev	3.4%	3.78%	4.76%	5.7%
Annualized Sharpe (Rf=0%)	1.2197	1.128	1.0868	0.9111
Historical VaR (95%)	-1.14%	-1.33%	-1.09%	-1.63%
Tracking Error	1.01%		2.12%	

Sources: Candriam, BofAML

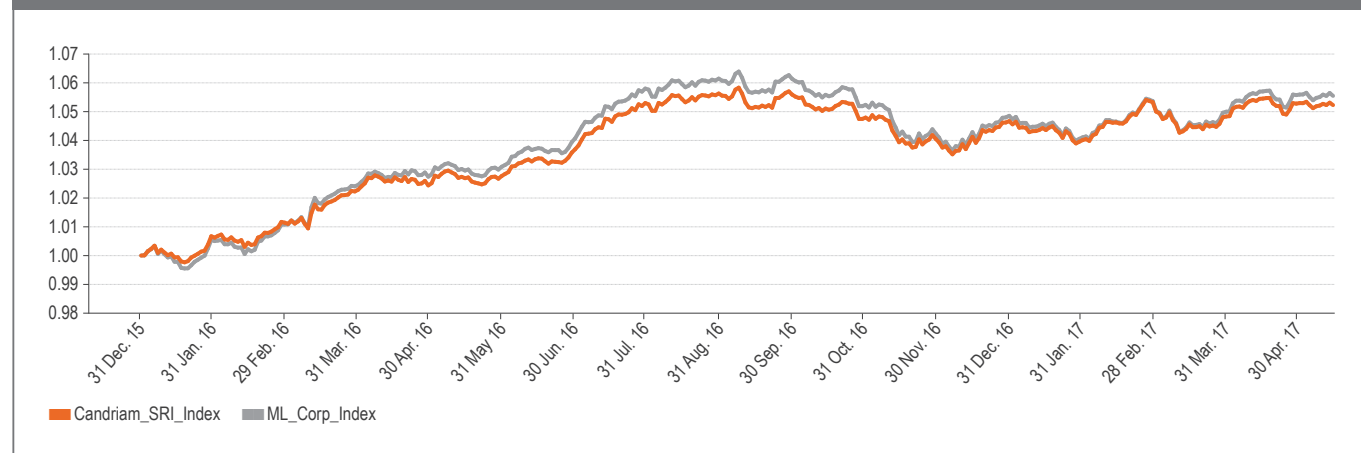
5. CONCLUSION

Based on the above analysis, Candriam is convinced that this portfolio construction methodology is highly valuable for bond investors seeking to match or even outperform the broad corporate bond market, but who cares about Sustainable and Responsible Investing. It shows that both objectives are not mutually exclusive.

Also, the most recent “live” performance of the indices (since the end of 2015, when the backtest ended) confirms the excellent risk-adjusted characteristics. The graphs below show the performance of the index compared to the broad corporate bond market.

The Risk and Performance Measures in table 3 also indicate a higher Sharpe Ratio, whereas Historical VaR is slightly reduced.

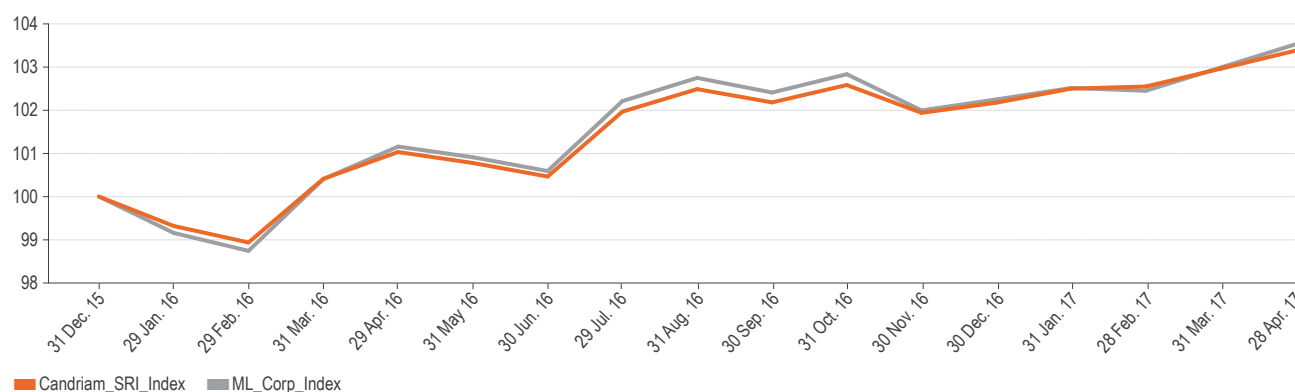
FIGURE 15: Live Cumulative Return



Sources: Candriam, BofAML

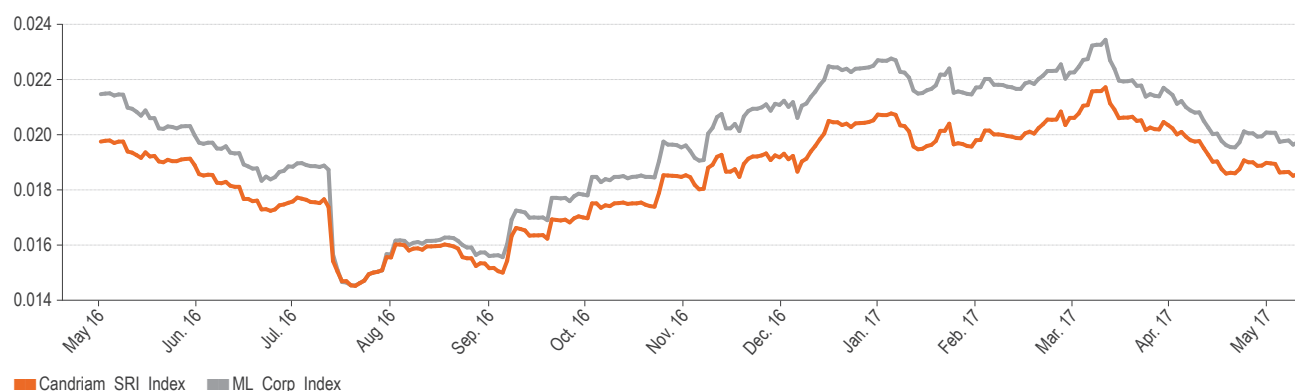
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FIGURE 16: Live Cumulative XSReturn vs Treasuries



Sources: Candriam, BofAML

FIGURE 17: 90d Rolling Risk (Standard Deviation)



Sources: Candriam, BofAML

TABLE 3: SRI Indices - Statistical Returns Table

	Candriam SRI Index	Market Cap Universe
Annualized Return	3.65%	3.87%
Annualized Std Dev	1.88%	2.02%
Annualized Sharpe (Rf=0%)	1.9471	1.9174
Historical VaR (95%)	-0.19%	-0.21%
Tracking Error	0.3%	

Sources: Candriam, BofAML

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