NORTHERN TRUST
ASSET MANAGEMENT

LOW VOLATILITY OR LOW CARBON: TACKLING THE TRADE-OFF

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Low volatility investors often seek improved returns and risk reduction relative to the benchmark. However, one risk that often goes unaccounted for in these strategies is climate change risk. Without other controls in place, low volatility strategies can take significant overweight positions to the Utilities sector, which is far and away the most carbon intensive sector. But does this mean that these two concepts are not compatible? Is it the case that, investors can manage volatility or climate change risk, but not both? We do not think this is the case.

In this paper, we will review some important dynamics related to low volatility investing, including the intersection of low volatility and low carbon. One important takeaway from this intersection analysis is that not all low volatility portfolios are amenable to low carbon integration. Last, we provide an example of a low volatility portfolio whose initial risk controls make it highly suitable to successfully integrate a carbon footprint reduction without sacrificing other investment objectives.

WHY LOW VOLATILITY?

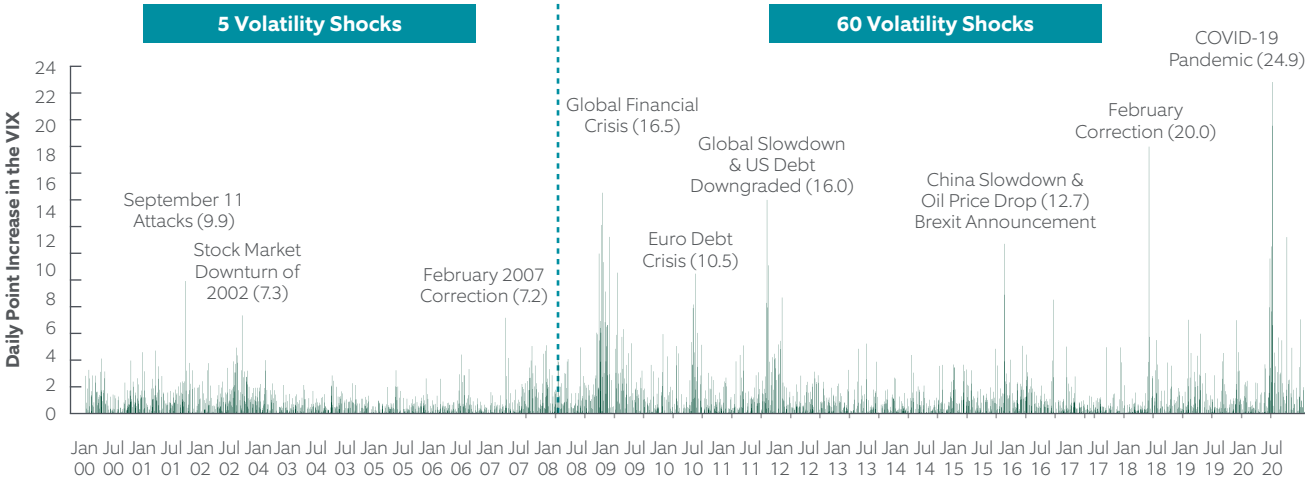
Low volatility investing goes against what we are all taught during our introductory investment classes, namely that to achieve higher returns, we have to take higher risk. In fact, studies dating back to at least 1972 have empirically documented that, ironically, stocks with low volatility outperform those with high volatility on a risk adjusted basis. Our own research dives deep into explaining the existence of the low volatility anomaly, and shows that the strength of the anomaly has been increasing over time (for more details, see *Low Volatility: An Evolution in Alpha and Low Volatility Beta Asymmetry: A Closer Look* [Hunstad and Lehnherr, 2020]).

Specifically, over the past decade, markets have experienced larger and more frequent volatility shocks, as shown in Exhibit 1.

This exhibit shows that, since the Global Financial Crisis, the number of volatility shocks has increased dramatically.* These shocks have been a key ingredient for the increased beta asymmetry that we observe in our research. Increased beta asymmetry is a good thing for low volatility because it means that low volatility stocks capture more of the upside, and/or less of the downside, of broader market movements.

The challenge for investors looking to invest efficiently in low volatility portfolios is that by decreasing one risk, other less obvious risks are introduced and exacerbated.

EXHIBIT 1: VOLATILITY SHOCKS HAVE INCREASED DRAMATICALLY



Source: Northern Trust, CBOE. From 31 December 1999 through 30 September 2020. Volatility increases are shown, with a shock defined as any daily increase in the VIX greater than five points.

The challenge for investors looking to invest efficiently in low volatility portfolios is that by decreasing one risk, other less obvious risks are introduced or exacerbated. Oftentimes, a low volatility portfolio can have significant overweights to sectors such as utilities or consumer staples and significant underweights to traditionally higher volatility sectors such as information technology. This is only natural, given these sectors' volatility profiles, which we will discuss next. Similar biases to region and country exposures can also introduce undesirable risks.

The issue with these exposures is that research suggests that they are not compensated in a systematic way (see Daniel [2020] and Ehsani, Hunstad, and Mehta [2020]). That is, these exposures add to risk, while not necessarily adding to return. The unfortunate issue pertaining to climate change risk management is that this sector preference for low volatility coincides with a significant potential for increasing another form of risk: carbon exposure.

* A volatility shock is defined as a day over day movement of at least 5 points in the CBOE Volatility Index (VIX).

LOW IN VOLATILITY, BUT HIGH IN CARBON

Pension funds, insurers and endowments are incorporating climate change risks into their strategies across the globe, increasingly using carbon budgets to reduce the carbon footprint across their assets. This is because there is an increased awareness about the importance of climate change and its material impact across all asset classes. Moreover, national governments and global organisations are pushing to adopt stricter carbon targets across all investments following the Paris Agreement, and the recently adopted EU regulation on Climate Benchmarks. These Climate Benchmarks include the EU Climate Transition (CTB) and EU Paris-aligned (PAB) benchmarks, which, despite certain differences, have one thing in common: a meaningful goal of decarbonization.

Although both benchmarks have the same criteria for decarbonization, the thresholds are different. The EU PAB benchmark is aligned to the Paris Agreement goal to limit the increase in global average temperatures to under 2°C above pre-industrial levels. Both benchmarks focus on carbon reduction – 30% for EU CTB and 50% EU PAB – in addition to several other metrics. There is also an embedded expectation of a roughly 7% absolute reduction in the carbon footprint year-over-year. Thus, when designing a low volatility portfolio that can also be referred to as low carbon, these decarbonization levels are important targets and milestones. However, decarbonization is not as simple as eliminating high carbon contributors because for many low volatility strategies, this could materially alter the portfolio itself. In fact, the majority of low volatility strategies in the market place are ill equipped to handle compliance with these benchmarks.

Our analysis shows that, on average, the gap in carbon intensity between low volatility funds and the benchmark, has widened since the end of 2017, as improvements in the carbon profile of the main indices have not flowed through to low volatility funds. In Exhibit 2, we analysed the carbon intensity – scope 1 and scope 2 carbon emissions divided by sales – for the average fund in the Morningstar Low Volatility Equity Universe versus the MSCI World. The average fund had a slight drop in its carbon intensity from 292 in 2017 to 287 in 2020, while the MSCI World has substantially reduced its carbon intensity moving from 196 in 2017 to 149 in 2020*

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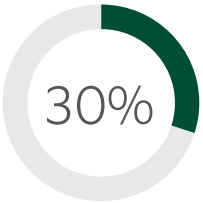
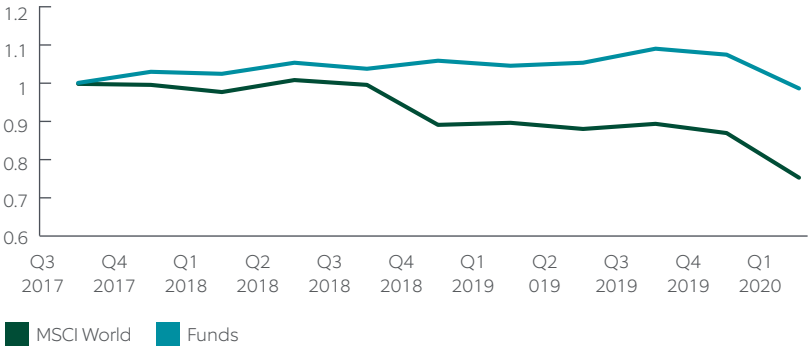


Carbon reduction for EU CTB

Carbon reduction for EU PAB

EXHIBIT 2: CARBON INTENSITY CHANGE THE PAST THREE YEARS



Source: Northern Trust, Morningstar, MSCI.
*All calculations are based on MSCI ESG carbon intensity metric WACI (Weighted Average Carbon Intensity) and they go from March 2017 to March 2020.

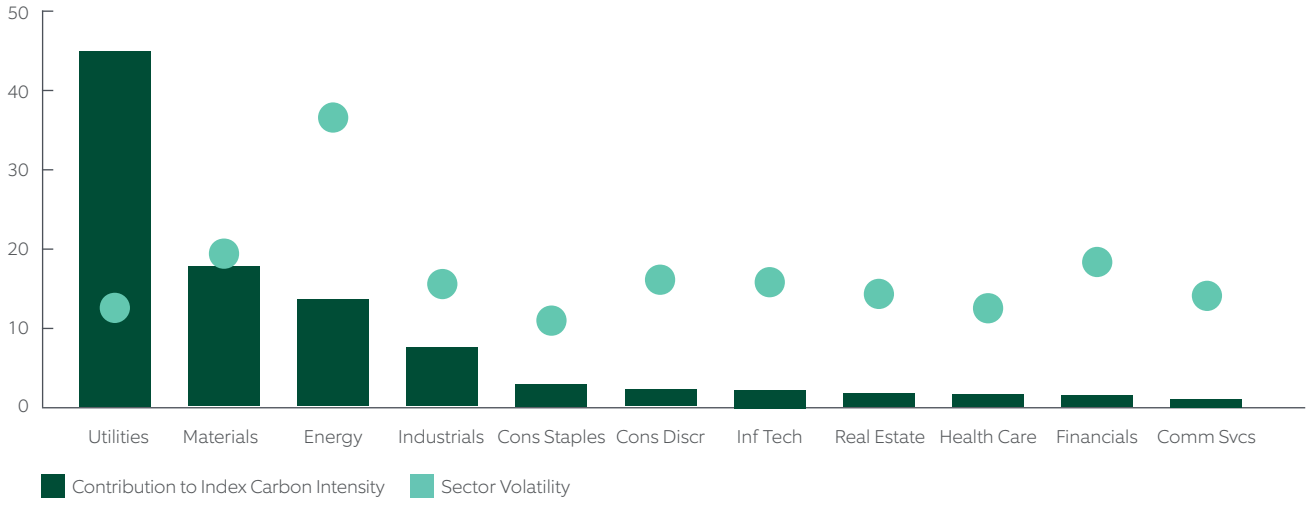
Why does low volatility tend to equate to high carbon? Exhibit 3 illustrates the proximate cause. In this exhibit, we display the five-year annualised volatility and the current carbon intensity for each sector in the MSCI World index. Here, we see that the Utilities sector is one of the main reasons that low volatility tends to equate to high carbon. Specifically, although the sector is low from a volatility standpoint, it has 15 times higher carbon intensity than the average MSCI World sector and is almost 2.5 times higher in carbon intensity than the next highest sector (materials).

We focus the analysis of this paper on carbon intensity emissions rather than looking at potential emissions from fossil fuel exposures. We note that the energy sector accounts for 74% of the potential emissions from fossil fuel reserves in MSCI World (as of 30 September 2020).

This sector tends to be a high volatility sector, so many low volatility strategies tend to naturally underweigh the sector, so potential emissions from fossil fuel tend to be less impactful on Low Vol strategies. Regardless of the characteristics, a low carbon strategy should target a reduction in potential emissions from fossil fuel reserves as illustrated in the following section.

Many low volatility strategies with naïve structures or limited risk controls will likely have a bias to utilities, leading to a higher carbon footprint relative to the benchmark.

EXHIBIT 3: VOLATILITY AND CARBON INTENSITY IN MSCI WORLD SECTORS



Source: Northern Trust, MSCI.
Carbon intensity defined as scope 1 and scope 2 carbon emissions divided by sales (tons CO2e/$M sales).
Volatility represents monthly realized sector volatility from 30 September 2010 through 30 September 2020.
Data as of 30 September 2020.

As a result, many low volatility strategies with naïve structures or limited risk controls will likely have a bias to utilities, leading to a higher carbon footprint relative to the benchmark. In fact, we found that in a universe of nearly 125 low volatility equity strategies across the world (source: Lipper), almost 80% of the strategies had a carbon footprint higher than that of the MSCI World universe. Does this mean climate aware investors need to abandon their low volatility strategies? Absolutely not!

CAN LOW VOLATILITY AND LOW CARBON WORK TOGETHER?

A key question to ask when evaluating low carbon considerations in low volatility portfolios is how impactful they will be to the strategy. Low volatility strategies designed with prevailing risk controls in place, such as Northern Trust's Quality Low Volatility (QLV), are more capable of handling low carbon goals than strategies that derive a significant amount of their active weights from low volatility, high carbon intensity sectors.

Applying risk controls to avoid uncompensated risks, such as sector risks, can be a strong first step to avoid a significant increase in the carbon content of the portfolio. However, not all low volatility strategies are designed in this way. For example, a low volatility portfolio without sector controls can have 200% or more of the carbon intensity of the cap weighted index. This can make it rather difficult to achieve low carbon objectives without making significant changes to the strategy.

To understand the impact of carbon reduction on a low volatility portfolio, we started with QLV without any carbon constraints, and then ran a frontier at different points of carbon reduction. We were interested in the change in the portfolio composition due to the carbon reduction. Because QLV is a quantitative strategy that is able to take advantage of securities that provide similar exposures, we focused our analysis on understanding at what point the pursuit of carbon reduction leads to losing low volatility exposure and the risk reduction properties of our strategy. As seen in Exhibit 4, our analysis shows that even at 50%, we achieve similar levels of risk reduction and exposure to low volatility stocks as the strategy that does not consider carbon reduction. Furthermore, the 50% carbon reduction potential is in line with the decarbonization targets of the CTB and PAB.

We think this type of analysis is critical because of the potential to significantly change the strategy when introducing a carbon reduction into an existing low volatility framework. It depends on how the non-carbon constrained low volatility portfolio is originally designed and constructed.

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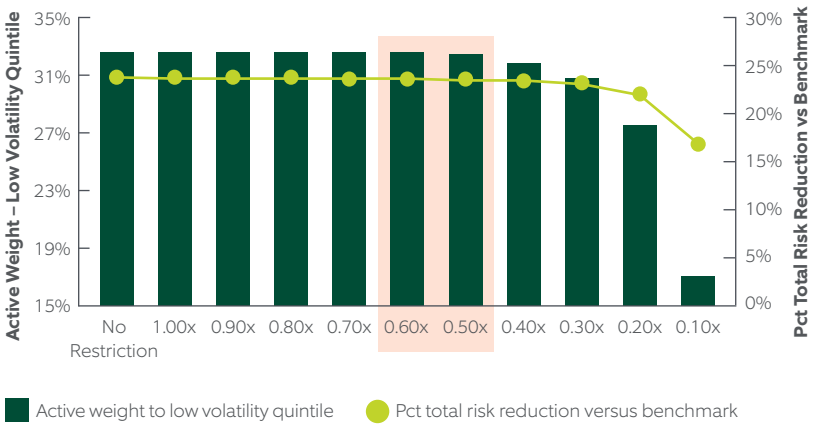
EXHIBIT 4: IMPACT TO QLV OF CARBON FOOTPRINT REDUCTION

Change in the low volatility factor due to carbon reduction versus MSCI World



Source: Northern Trust, MSCI

As we stated at the outset, we believe low volatility and low carbon can be compatible, but we need to be mindful of how we integrate a low carbon framework. To best demonstrate how this is possible, we share hypothetical results of a low volatility portfolio that modifies the investment process of our QLV strategy. Specifically, we included an explicit carbon emissions reduction target of 40-50%.

Briefly, our QLV strategy utilises a minimum variance optimisation and favours high quality stocks, while strictly controlling risks at the sector, country, region, and stock position level. The fact that the strategy already controls for sector risks makes it an ideal starting point for low carbon integration because it will not require massive sector changes to the strategy such that could occur in other, non-sector controlled low volatility strategies.

Our analysis runs from January 2010 through September 2020, with carbon data availability being the limiting variable to taking these hypothetical results farther back. Exhibits 5 and 6 show selected characteristics for the strategy. In addition to achieving objectives surrounding risk and return, we highlight the carbon footprint reduction target was also achieved.

EXHIBIT 5: HYPOTHETICAL QUALITY LOW VOLATILITY LOW CARBON STRATEGY PERFORMANCE (GROSS OF FEE)

	YTD	1 YEAR	3 YEAR	5 YEAR	10 YEAR	SINCE INCEPTION
Northern Trust Quality Low Volatility Low Carbon World (gross of fee)	2.61%	7.50%	9.46%	11.38%	11.41%	11.68%
MSCI World Gross Total Return Index in USD	2.12%	10.99%	8.33%	11.10%	9.99%	10.07%
Active return	0.48%	-3.49%	1.13%	0.28%	1.43%	1.60%

Source: Northern Trust, MSCI. Inception is 31 January 2010. As of 30 September 2020.

EXHIBIT 6: HYPOTHETICAL QUALITY LOW VOLATILITY LOW CARBON STRATEGY PERFORMANCE (GROSS OF FEE)

SINCE INCEPTION*	NORTHERN TRUST QUALITY LOW VOLATILITY LOW CARBON WORLD (GROSS OF FEE)	MSCI WORLD GROSS TOTAL RETURN INDEX IN USD
Annualised return	11.68%	10.07%
Annualised volatility	10.48%	14.17%
Sharpe ratio	1.06%	0.69
Sortino ratio	1.43	0.93
Maximum drawdown	-16.71%	-20.93%
Historical beta	0.70	1.00
Tracking error	5.28%	
Information ratio	0.30	
Upside capture ratio	76.9%	
Downside capture ratio	61.8%	
Carbon intensity as of 30.09.20	75.6	145.4
Reduction in carbon intensity as of 30.09.20	48.0%	

Source: Northern Trust, MSCI. Inception is 31 January 2010. As of 30 September 2020.

CONCLUSION

When building a low volatility portfolio, investors may unintentionally increase other forms of risk. As we have shown in this paper, one risk that can become particularly pronounced is climate change risk. However, this does not mean that investors must accept high carbon exposure in their low volatility portfolio. This paper discussed the primary culprit behind the high carbon posture of uncontrolled low volatility portfolios – significant exposure to the carbon intensive Utilities sector – and highlighted the importance of risk controls as a remedy. Increasing carbon reduction within a low volatility strategy is feasible, but the building blocks and risk controls of the original strategy also matter. It is also essential to understand the relative impact of carbon integration on the low volatility strategy.

We also provided hypothetical results that modified our existing quality low volatility strategy to integrate a reduction in carbon exposure. Because this strategy starts from a place where risk management is a key feature, the integration of a carbon reduction was less impactful to other portfolio objectives than for a strategy with a significant bias towards utilities.

These results suggest that tackling low carbon within low volatility strategies is possible and investors can choose a strategy that addresses both.

Tackling low carbon within low volatility strategies is possible and investors can choose a strategy that addresses both.

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