

Inclusion or exclusion?

Equity Quantitative Research

August 2018

For Institutional Investor and Financial Advisor Use Only



Exploring carbon as a “pure” factor

Introduction

According to the World Economic Forum’s 2018 Global Risks report, three of the top five global risks of the coming decade – both in terms of impact and likelihood – are directly or indirectly linked to changes in the earth’s climate system. In particular, the last four annual reports have ranked the failure of climate change mitigation and adaptation as one of the five risks that will have the biggest impact in the next 10 years. As this concern over climate change persists, government action is likely to accelerate, including regulation to reduce carbon emissions and to shift economies towards low-carbon energy supplies.

Both as agents of change and to protect their assets, institutional investors are increasingly seeking equity solutions which incorporate climate considerations in an efficient manner, while respecting their investment objectives.

Two approaches currently dominate investment choices, both of which restrict the investment universe – either by excluding ‘fossil fuel related’ stocks or by restricting choice to a number of ‘climate themed’ names. The limitations of these approaches are that, from a portfolio and risk management perspective, any restriction can potentially introduce biases to the portfolio – for example, excluding commodity-exposed stocks can result in an overweight to a given sector or factor. Importantly, exclusion also restricts investors’ ability to engage with companies on adopting business practices in line with the lower-carbon transition.

For these reasons we believe inclusion to be preferable, reducing a portfolio’s carbon footprint through passive tilting or factor optimisation. Indeed, integrating environmental, social and governance (ESG) measures, notably carbon-footprint reduction, as present and future drivers of stock performance can help mitigate long-term risks, and thereby generate higher risk-adjusted returns while keeping portfolios aligned with broader objectives. However climate considerations are best implemented as a “pure” factor tilt and integrated into the portfolio construction approach.

This paper explores how such strategies can be implemented, and discusses their typical pitfalls and benefits.



HSBC
Global Asset
Management

Climate change is the key challenge

Climate change does not only have a profound impact on human health and ecosystems; it also presents a systemic risk to our economy.

The Economist Intelligence Unit estimates that, in present value terms, the value at risk of the global stock of manageable assets from climate change ranges from \$4.2 trillion to \$43 trillion between now and the end of the century. For instance, warmer temperatures could impact crops, and rising sea levels could flood cities and factories.

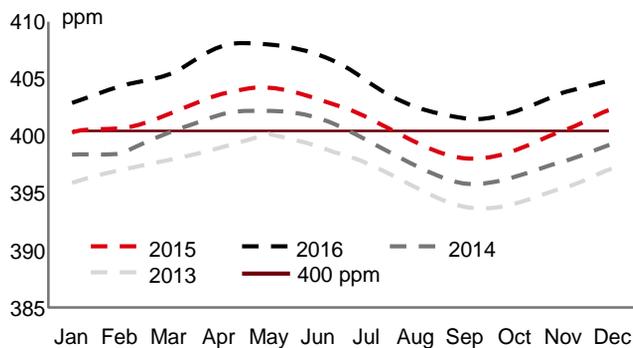
At the security level, this can translate into impacts on real income, cash flows, balance sheets and credit ratings. Recognising the systemic nature of climate change, in December 2015 governments of 197 countries signed a global agreement to limit the increase in the global average temperature to well below 2°C above pre-industrial levels.

While this is good news, for investors it presents a second set of challenges: transitioning to an economy consistent with the 2-degree target requires further policy action by governments, but also significant changes to carbon-intensive sectors of the economy, such as energy, transport and agriculture. The policy, legal, technology and market changes present risks and potentially high costs (either direct or indirect) for carbon-intensive companies, likely to impact their securities. As outlined by the Financial Stability Board (FSB) backed Taskforce on Climate-related Financial Disclosures (TCFD), these transition risks, alongside the physical risks of climate change, are not yet appropriately priced by the market. The TCFD has therefore recommended consistent, climate-related financial disclosures to help investors appropriately assess and price climate-related risks and opportunities.

This is crucial because carbon-intensive companies currently make up a significant segment of major stock markets around the world. For example, energy, utilities and industrials sectors have historically represented as much as 25% of the total weighting of developed-market indices.

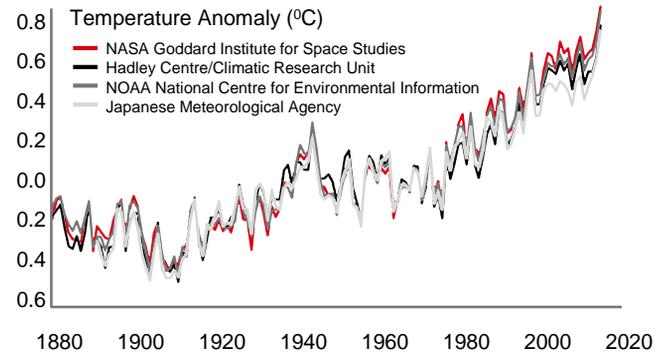
Consequently, most investors have a substantial exposure to carbon-intensive stocks, including companies that produce oil and gas, coal, electric power, minerals, metals and more. The race to limit climate change, therefore, presents investors with risks – and opportunities – that could materialise in the short, medium and long term.

CO₂ concentration on the rise



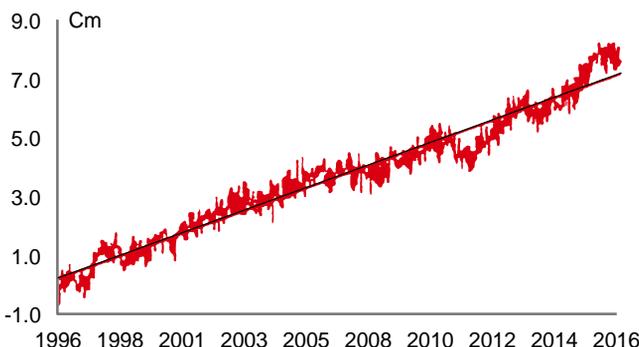
Source: Earth System Research Laboratory (NOAA)

Temperature increases



Source: NASA. Temperature data from four international science institutions show rapid warming in the past few decades and that the last decade has been the warmest on record.

Mean sea level rise



Source: Univ. of Colorado; Shows the global mean sea level rise over 1996 level

March Arctic sea ice extent



Source: NSIDC, NOAA

Climate metrics and portfolio construction

Whatever the future path of climate change policy and its effects on technology deployment, stock prices are likely to be affected. Rather than wait for certainty, investors should therefore take advantage of emerging methods to manage carbon risk and protect their portfolios.

Measuring carbon intensity

There are limited metrics to fully measure stock-level climate risk. The most commonly used is the carbon footprint, or carbon intensity. Current carbon footprinting metrics present well-documented challenges and limitations, including the fact that they should not necessarily be interpreted as risk metrics. However, the TCFD has recommended weighted-average carbon intensity as the key disclosure metric for portfolios, it being the best currently available solution.

This metric measures a portfolio's carbon exposure, by calculating the carbon intensity of each company held, expressed in tonnes of carbon dioxide equivalent (CO₂e) per USD million in revenue. All intensities are then added up pro rata of their weighting in the portfolio (see below).

Carbon data sources

The availability of good quality carbon data is a well-known challenge. While a number of jurisdictions have specific carbon or greenhouse gas reporting requirements, for certain countries, sectors and smaller-cap companies, data is less available. However, as requirements become more stringent and investors more demanding, coverage is gradually improving.

There are now a variety of carbon-data providers, each providing differing coverage, and each taking a different approach to estimating the data gaps. These can be combined to compare results, cover the gaps, and improve measures across a portfolio. For example, we use a number of leading data providers, from Bloomberg (using CDP data) to ISS-Ethix Climate Solutions (previously South Pole carbon), FTSE Russell, and S&P Trucost.

This carbon data can then be used in the investment process on a relative basis, looking at companies' carbon intensities within a sector, as well as on an absolute basis, allowing investors to adjust their portfolio's carbon footprint, for instance through weightings or carbon-intensity-based selection.

Using sector tilts

An alternative approach is to determine portfolio exclusion and/or weighting based on revenues and/or reserves associated with particular products. For climate-related issues, this approach would typically exclude or underweight stocks associated with fossil fuels and overweight renewable energy businesses, such as solar.

However, as discussed in our introduction, exclusions present several drawbacks. The first is that investors cannot engage with companies they don't hold – through voting or company meetings for example – meaning they can't put pressure on carbon-intensive companies to improve their record. In contrast, inclusion allows investors to play a more active stewardship role, encouraging companies' transition to a low-carbon economy and helping safeguard the sustainability of future returns.

Secondly, from a portfolio and risk management perspective, any restriction can potentially introduce biases to the portfolio. Extensive academic research and back-testing show that, while very targeted exclusions, such as controversial weapons, present a minor, short-term risk of deviation, with broader exclusions like fossil fuels, things become more complicated. The deviation risk over the short term is far bigger – despite a minimal difference in long-run performance.

$$\sum_i \left(\frac{\text{current value of investment } i}{\text{current portfolio value}} * \frac{\text{issuer's Scope 1 and Scope 2 GHG emissions}}{\text{issuer's \$m revenue } i} \right)$$

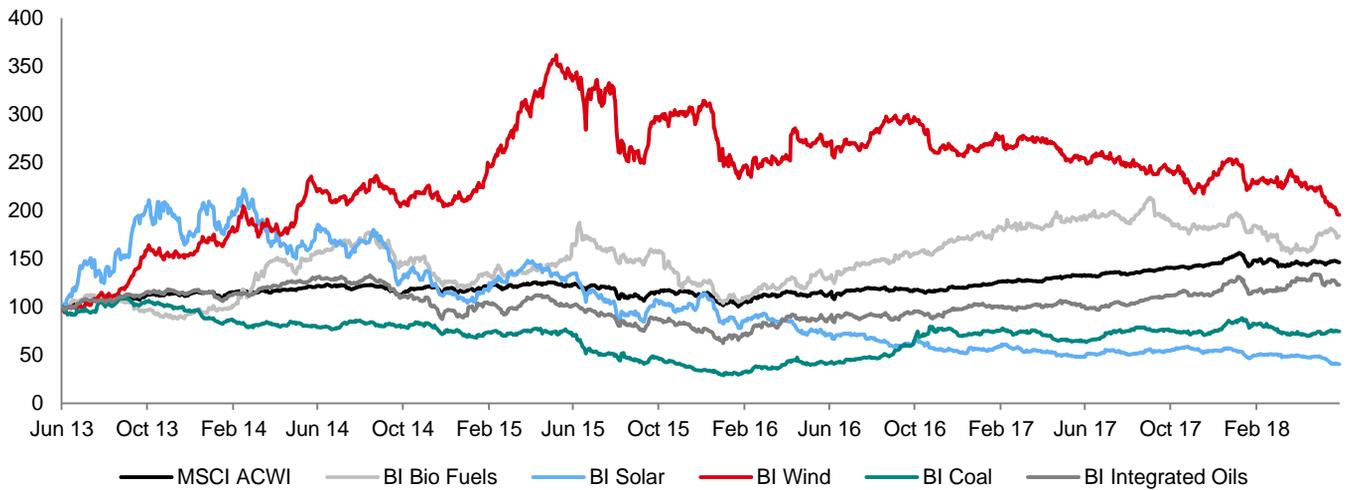


Exclusion biases

Each carbon-sensitive group of stocks exhibits its own particular cyclicality, meaning that any exclusion approach is itself exposed to this cyclicality. For example, a low-carbon strategy might tilt towards solar stocks, which have underperformed over the last few years. This is illustrated in the chart below, which shows the performance of a few climate-sensitive sectors over the last five years, compared with the MSCI ACWI.

Similarly, while the case for total fossil-fuel divestment is compelling given the upcoming transition to a low-carbon economy, over the short term investors' fossil fuel stocks (using oil companies as a proxy) have in fact suffered significant volatility from the moves in the oil price. The fall in oil prices in 2015-2017 undoubtedly helped those strategies excluding fossil fuels but the oil-price reversion seen in 2018 has resulted in negative performance for exclusion strategies.

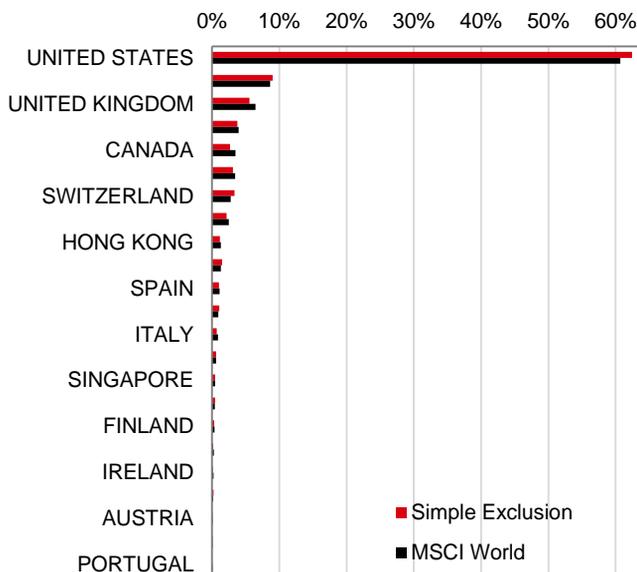
Green energy vs fossil fuels - Market performance past five years (as at June 2018)



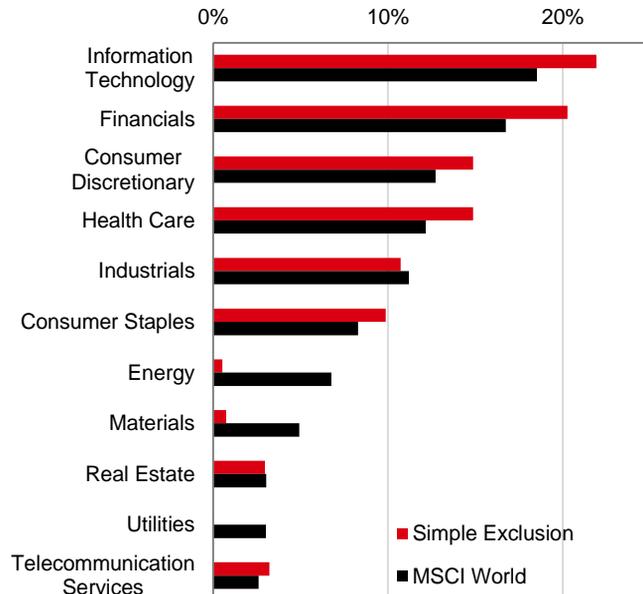
Source: HSBC Global Asset Management, Bloomberg, June 2018. **Past performance is shown for illustrative purposes only, refers to the past and should not be relied on as indication for future returns.**

As shown below, lower-carbon exclusion strategies also introduce sector and country biases. In this example of an exclusion approach for the MSCI Developed Markets universe, we can see that a simple exclusion (with the remaining stocks reweighted to 100%) creates an overweight to the US market and to the Financials sector.

Exclusion – Country exposure



Exclusion – Sector exposure



Source: HSBC Global Asset Management, June 2018.

Considering carbon as an investment factor

Low-carbon portfolio optimisation offers another option which, without exclusion, nevertheless allows investors to increase their exposure to companies or assets benefitting from climate action strategies, which are more likely to be supported by new technology solutions.

In principle, low-carbon portfolios support the flow of capital to a more resilient, lower-carbon economy, which should help reduce the long-term physical impacts of climate change.

Investors typically think about carbon characteristics in terms of stock selection and portfolio construction, and not as a systematic factor. Yet we have seen that carbon tilts are clearly systematic in nature – return differences are cyclical and apply to a group of stocks, and the variation in performance is driven by a “systematic” effect.

This “systematic” effect has historically been driven by sector moves – through the omission of energy companies, for example – rather than from stock-level effects. It follows that we can think of carbon as a systematic factor not captured by traditional risk models.

Recognising the excess risk (relative to the benchmark) introduced by a simple exclusion approach, we instead look to integrating carbon as a “factor” in the traditional sense.

The question for investors is whether it is a “risk premium” factor or simply a “risk” factor. The former can deliver long-term outperformance while the latter does not. Yet, either way, we believe it is in investors’ interests to isolate carbon exposure independently of sectors and countries. This can be done using an optimisation technique which allows us to build “pure” factors – by identifying stocks with both a low carbon intensity and a minimal exposure to other systematic factors.

Specific risk models and optimisation tools can be used to integrate lower-carbon either as a new tilt to a “passive” or within a multi-factor solution. The former will seek to neutralise all systematic factors while delivering a positive tilt to low-carbon stocks. The latter adds positive factor tilts as well as the carbon tilt, viewing low carbon as an explicit but independent tilt to more traditional factors.

While both seek to achieve a lower portfolio-level carbon intensity, the two approaches offer different risk/ return profiles:

- Passive carbon tilting is designed to tightly track the index, while delivering a tilt to the lower-carbon measure
- Carbon factor optimisation aims to deliver multi-factor outperformance in conjunction with a carbon improvement

Two approaches for low-carbon-tilted systematic equity portfolios:

Passive carbon tilting

Aiming to track the index with a carbon improvement

Carbon factor optimisation

Aiming to outperform the index with a carbon improvement

Approach 1: Passive carbon tilting

Investors who allocate to lower-carbon strategies would expect to benefit from a shift in the global economy to more carbon-resilient firms. In the long term, they would expect a tilt to lower-carbon to deliver outperformance, given their beliefs in upcoming changes to the global economy.

To deliver this while addressing the need for passive solutions which provide returns and exposures close to the cap-weighted benchmark’s, we believe integration can deliver better results than a “best-in-class” approach – selecting the stocks with low carbon intensity in each sector.

To achieve this goal, carbon considerations can be integrated into the portfolio optimisation framework, while ensuring that all systematic exposures are minimised (at country, industry and factor level).

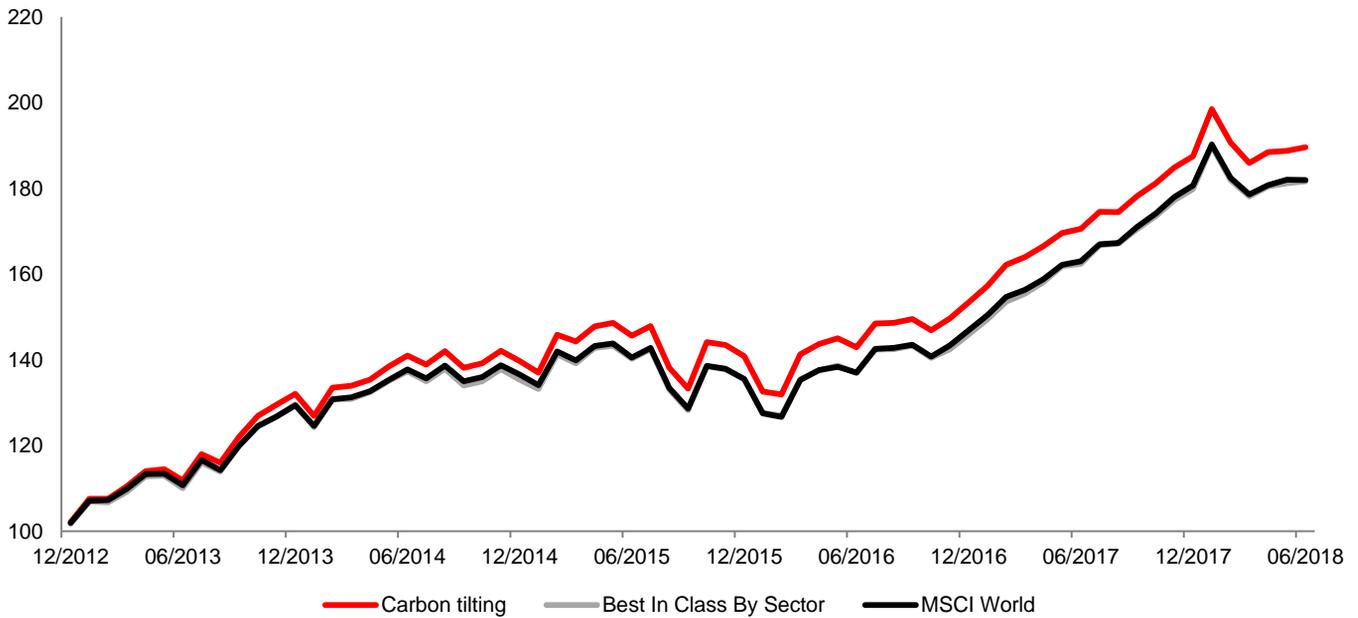
According to our simulations, the resulting tilted approach derives nearly all its tracking error from the carbon tilting and – more importantly – delivers a better carbon-footprint improvement than the “best-in-class” approach.

The approach can deliver carbon-footprint improvements with no penalty to performance or exposure to excessive tracking error. It can therefore meet both the low-cost and lower-carbon objectives common to a number of institutional investors.

Furthermore, taking an integrated approach avoids the systematic biases of simple exclusion explored earlier. It also delivers a lower tracking error against the benchmark than exclusion.

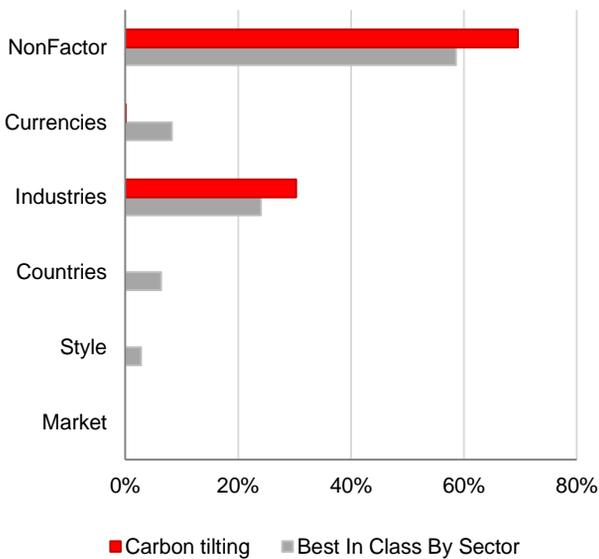
According to our simulations, the “pure factor” approach, when compared to the typical “best-in-class” approach would have delivered better performance, lower systematic risks and a lower carbon footprint.

Cumulative returns – MSCI World vs Carbon tilting vs Best-In-Class-by-Sector approach

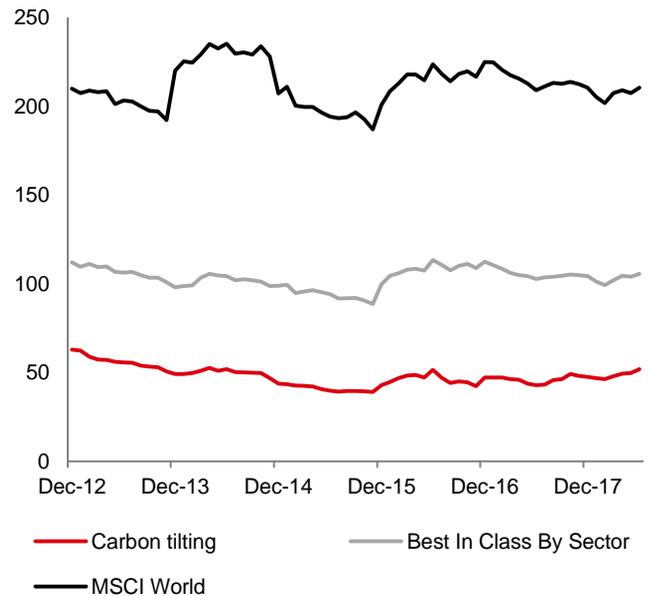


Tracking Error decomposition

80 % of tracking error comes from Carbon vs Best-In-Class



Carbon Intensity - tonnes CO2e/USD million Carbon footprint improvement vs Best-In-Class



Source: HSBC Global Asset Management, as at end of June 2018

Simulated data is shown for illustrative purposes only, refers to the past and should not be relied on as indication for future returns.

Simulated data is shown for illustrative purposes only, and should not be relied on as indication for future returns. Simulations are based on Back Tested results. Backtested results have inherent limitations, some of which are described below. Backtested returns do not represent the performance results of actual trading or portfolio asset allocations for any client assets or portfolios. Backtested returns are calculated through the retroactive application of the proposed asset allocation to its relevant benchmark and are produced with the benefit of hindsight. Therefore, the performance results are not indicative of the skill of HSBC Global Asset Management or of future results. Since backtested performance results do not represent actual trading or portfolio asset allocations they may not reflect the impact that material economic and market factors might have had on decisions made in actual trading or portfolio asset allocations. No representation is being made that any portfolio will or is likely to achieve profits or losses similar to those shown. In fact, there are frequently significant material differences between backtested performance and performance results subsequently achieved by following a particular strategy. See the Important Information section for additional information on backtested results.

Approach 2: Carbon factor optimisation

However, many investors also seek outperformance and multi-factor strategies have become very popular in recent years. Investors have taken to factor investing strategies as they allow them to target a selective exposure to systematic 'premia' which can deliver outperformance in a risk-controlled and cost-effective way.

This approach is often characterised as a middle way between passively-managed index funds and actively-managed equity funds. It provides transparent and cost-efficient solutions like the former, while retaining the latter's aim of beating the index. The systematic approach also means lower costs than with traditional active funds.

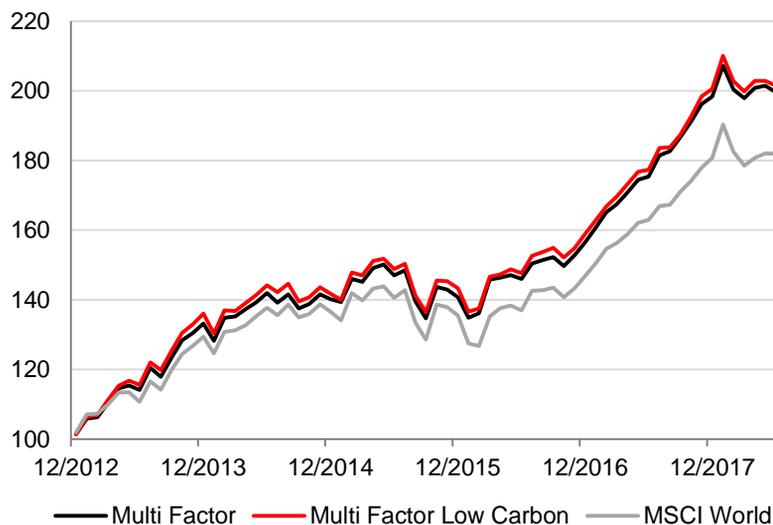
When considering an allocation to factor investing, investors need to recognise that, while a stock can easily be attributed to a single country or sector, the same cannot be said for a factor. Across a large number of stocks, this means that, at times, a non-factor strategy purporting to be 'value' can in fact have significant exposure to momentum, quality, low beta and other risks. These unintended factor exposures have become a concern to investors. Many have found that shifting their equity allocations to equity factors has been a good solution to minimise unintended exposures.

Integrating the carbon factor into a multi-factor strategy

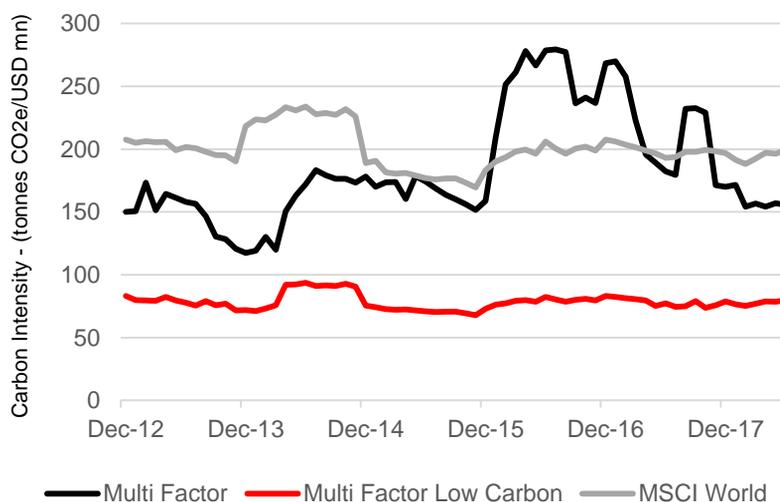
To test the integration of carbon-intensity as an added factor into our typical multi-factor model, we followed our standard multi-factor investment process, simply adding a stock-level scoring of carbon intensity. The portfolio is thus optimised on multi-factor tilts and carbon intensity – so high-carbon names are penalised but not excluded. The resultant portfolio is highly diversified, and exhibits the same factor tilts as a typical multi-factor strategy but with an additional carbon tilt.

Our simulations show that the "pure factor" approach allows the portfolio to match the multi-factor strategy's outperformance while delivering a very meaningful reduction in carbon metrics.

Cumulative returns – Multi Factor Equity Strategy vs Multi Factor Lower Carbon Equity Strategy vs MSCI Global Developed



Carbon metrics - Multi Factor Equity Strategy vs Multi Factor Lower Carbon Equity Strategy vs MSCI Global Developed



Source: HSBC Global Asset Management, as at end of June 2018

Simulated data is shown for illustrative purposes only, refers to the past and should not be relied on as indication for future returns. Simulated data is shown for illustrative purposes only, and should not be relied on as indication for future returns. Simulations are based on Back Tested results. Backtested results have inherent limitations, some of which are described below. Backtested returns do not represent the performance results of actual trading or portfolio asset allocations for any client assets or portfolios. Backtested returns are calculated through the retroactive application of the proposed asset allocation to its relevant benchmark and are produced with the benefit of hindsight. Therefore, the performance results are not indicative of the skill of HSBC Global Asset Management or of future results. Since backtested performance results do not represent actual trading or portfolio asset allocations they may not reflect the impact that material economic and market factors might have had on decisions made in actual trading or portfolio asset allocations. No representation is being made that any portfolio will or is likely to achieve profits or losses similar to those shown. In fact, there are frequently significant material differences between backtested performance and performance results subsequently achieved by following a particular strategy. See the Important Information section for additional information on backtested results.

Conclusion

Institutional investors are increasingly concerned by the investment challenges created by climate change and the initiatives taken around the world to limit its effects on ecosystems, people and economies.

Many are committing to support the transition to a lower-carbon economy through responsible investing. In addition, they need to protect their portfolios against the transition and physical risks of climate change.

While sector tilts or exclusions may seem sensible, they present significant limitations, both reducing the opportunity for shareholder engagement with companies, and creating unintended portfolio biases.

Another option is to use measures of a portfolio's carbon intensity to construct a low-carbon tilt without actual exclusions. This can be achieved either through a passive solution, to track an index while delivering a lower carbon-footprint, or by integrating carbon intensity as an additional factor in a multi-factor approach.

Obtaining good quality carbon footprint data with full coverage remains a key challenge to this approach, which also requires integrating and analysing all the additional information systematically to be able to deliver a truly lower-carbon portfolio. However, as investor and regulatory support for the implementation of the TCFD recommendations increases, we anticipate that climate-related disclosure, including carbon data, will become more widespread. This should improve data quality and coverage in the coming months and years.

Integrating a lower-carbon tilt to passive or multi-factor portfolios can allow investors to support the transition and mitigate climate-change risks in their portfolios while continuing to meet their other investment objectives and guidelines.

Authors



Vis Nayar

Deputy CIO, Equities
HSBC Global Asset Management

Vis Nayar is Deputy CIO, Equities and is responsible for investment research. He has been working in the industry since 1988, joining HSBC Markets in 1996, and has been with HSBC Global Asset Management since 1999. Over his career Vis has extensive research and portfolio management experience in the long only equity, alternative investments and structured products businesses.

Vis holds a BSc in Electrical Engineering from Imperial College, University of London and a Masters in Finance from London Business School. He is a CFA charterholder, holds a Certificate in Quantitative Finance (CQF) and also qualified as a Chartered Accountant in the UK. He is also a member of the advisory board for the Masters in Finance programmes at Imperial College.



Stephanie Maier

Responsible Investment
HSBC Global Asset Management

Stephanie Maier joined HSBC Global Asset Management in 2017 as Director, Responsible Investment. Previously, Stephanie was Head of Responsible Investment Strategy and Research at Aviva Investors and prior to that, Head of Research at EIRIS (now VigeoEIRIS). She has been working in the corporate governance and responsible investment industry since 2002. Stephanie holds a BA (Hons) in Biological Sciences from Oxford University, a MSc (Distinction) in Environmental Technology from Imperial College and the Investment Management Certificate (IMC). Stephanie is also on the Boards of the Aldersgate Group, Vice-Chair for the UK Sustainable Investment and Finance Association (UKSIF) and Chair of the Institutional Investors Group on Climate Change (IIGCC) Corporate Programme.



Ioannis Kampouris

Quantitative Research Analyst
HSBC Global Asset Management

Ioannis Kampouris is a Quantitative Research Analyst in Global Equity Research and has been working in the industry since 2010. Prior to joining HSBC, Ioannis worked as a Quantitative Analyst at Gulf International Bank (GIB). He specializes in quantitative strategies research and development, statistical modelling and application of advanced optimization methods. Ioannis holds an MSc in Computational Statistics and Machine Learning from University College London (UCL) and MEng in Computer Engineering and Informatics from University of Patras (Greece).



Paul Denham

Lead Structured Equity Research Analyst
HSBC Global Asset Management

Paul Denham is the Lead Structured Equity Research Analyst in Global Equity Research and has been working in the industry since 2004. Prior to joining HSBC in 2015, Paul worked as an Associate at Credit Suisse and as an independent research analyst. He holds a MA in Physics & Philosophy from the University of Oxford and is a CFA Charterholder.

Key risks

The value of an investment in the portfolios and any income from them can go down as well as up and as with any investment you may not receive back the amount originally invested.

- Exchange rate risk: Investing in assets denominated in a currency other than that of the investor's own currency perspective exposes the value of the investment to exchange rate fluctuations.
- Derivative risk: The value of derivative contracts is dependent upon the performance of an underlying asset. A small movement in the value of the underlying can cause a large movement in the value of the derivative. Unlike exchange traded derivatives, over-the-counter (OTC) derivatives have credit risk associated with the counterparty or institution facilitating the trade.
- Emerging market risk: Emerging economies typically exhibit higher levels of investment risk. Markets are not always well regulated or efficient and investments can be affected by reduced liquidity.
- Operational risk: The main risks are related to systems and process failures. Investment processes are overseen by independent risk functions which are subject to independent audit and supervised by regulators.
- Real estate risk: Cost of acquisition and disposal, taxation, planning, legal, compliance and other factors can materially impact real estate valuation.
- Liquidity risk: Liquidity is a measure of how easily an investment can be converted to cash without a loss of capital and/or income in the process. The value of assets may be significantly impacted by liquidity risk during adverse market conditions.

Important information

HSBC Global Asset Management is a group of companies in many countries and territories throughout the world that are engaged in investment advisory and fund management activities, which are ultimately owned by HSBC Holdings plc. HSBC Global Asset Management is the brand name for the asset management business of HSBC Group. HSBC Global Asset Management (Canada) Limited is a wholly owned subsidiary of, but separate entity from, HSBC Bank Canada and provides services in all provinces of Canada except Prince Edward Island.

This information is intended for institutional / qualified investors only.

This material has been prepared by HSBC Global Asset Management (UK) Ltd and has been approved for use in Canada, it is distributed for informational purposes only and is not a solicitation or an offer to buy any security or instrument or to participate in any trading or investment strategy. All opinions and assumptions included in this presentation are based upon current market conditions as of the date of this presentation and are subject to change. All investments involve risk including the loss of principal. This presentation contains data compiled from third party sources believed to be reliable, but the accuracy of such data has not been verified. Any portfolio characteristics shown herein, including position sizes and sector allocations among others, are generally averages and are for illustrative purposes only and do not reflect the investments of an actual portfolio unless otherwise noted. The investment guidelines of an actual portfolio may permit or restrict investments that are materially different in size, nature and risk from those shown.

Any forecast, projection or target contained in this presentation is for information purposes only and is not guaranteed in any way. HSBC accepts no liability for any failure to meet such forecasts, projections or targets.

This presentation outlines potential investment vehicles and makes certain assumptions about their structure, strategies and market environment, including projections about their underlying assets, none of which have been purchased. All terms used herein are indicative and subject to change. Accordingly, there can be no assurance that the assumptions will prove to be correct, or that actual returns will be consistent with those described herein.

Source: MSCI, the MSCI information may only be used for your internal use, may not be reproduced or disseminated in any form and may not be used as a basis for or a component of any financial instruments or products or indices. None of the MSCI information is intended to constitute investment advice or a recommendation to make (or refrain from making) any kind of investment decision and may not be relied on as such. Historical data and analysis should not be taken as an indication or guarantee of any future performance analysis, forecast or prediction. The MSCI information is provided on an "as is" basis and the user of this information assumes the entire risk of any use made of this information. MSCI, each of its affiliates and each other person involved in or related to compiling, computing or creating any MSCI information (collectively, the "MSCI Parties") expressly disclaims all warranties (including, without limitation, any warranties of originality, accuracy, completeness, timeliness, non-infringement, merchantability and fitness for a particular purpose) with respect to this information. Without limiting any of the foregoing, in no event shall any MSCI Party have any liability for any direct, indirect, special, incidental, punitive, consequential (including, without limitation, lost profits) or any other damages. (www.msci.com)

Copyright © HSBC Global Asset Management (Canada) Limited 2018. All rights reserved.

Expiry: August 31, 2019

DK1800380A

