Andrew Ang, PhD
BlackRock Systematic
January 2022

BlackRock.
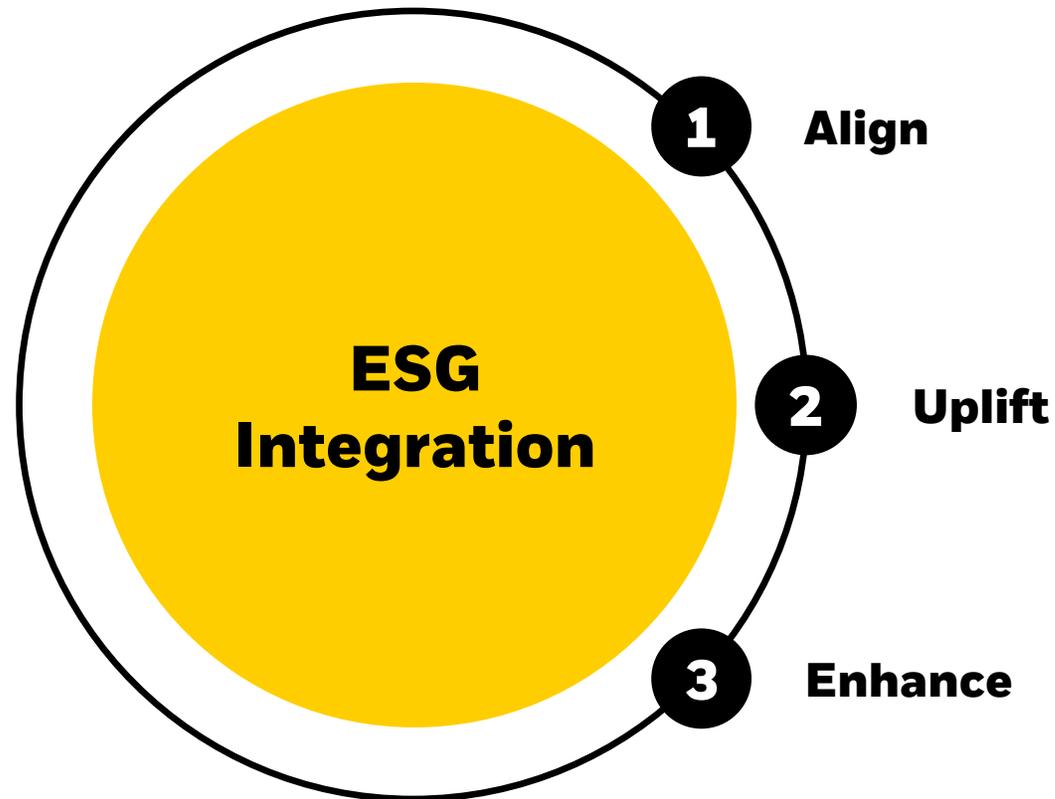
Sustainable alpha: Doing well by doing good

ESG and style factors

Chan, Y., K. Hogan, K. Schwaiger, and A. Ang, 2020, ESG in Factors, Journal of Portfolio Management

Integrating ESG with style factors

ESG Integration

1 **Align**

2 **Uplift**

3 **Enhance**

Source: BlackRock, December 2021. The environmental, social and governance ("ESG") considerations discussed herein may affect an investment team's decision to invest in certain companies or industries from time to time. Results may differ from portfolios that do not apply similar ESG considerations to their investment process.

Factors can be ESG friendly

Correlations of ESG Scores and Factor Scores

14%

Low Volatility has tended to have the highest correlation with ESG score

9%

Quality tends to have a positive correlation with ESG score

2%

Momentum tends to have near-zero correlation with ESG score

-3%

**Value** tends to have near-zero correlation with ESG score

-18%

Size tends to have a negative correlation with ESG score

Source: BlackRock, as of November 2019. The data reported shows the relationship between factors and ESG scores using the MSCI World Index® as an investment universe. Data are representative of the average monthly cross sectional correlation between factor scores and ESG scores for January to November 2019. ESG scores are based on MSCI ESG scores. Factor scores are measured across the universe for each of five factors: Quality, Low Volatility, Momentum, Value, and Size. Higher factor scores indicate a stronger preference for a given security by a given factor. To calculate the cross sectional correlations for each month, we first take the MSCI ESG score for each security in the universe. Next, for each factor, we score the securities using an equal-weighted combination of the following measures: Low Volatility (specific risk), Quality (Gross Profitability), Momentum (Price Momentum, Analyst Revisions), Value (Cash Flow from Operations to Price, Forward Earnings Yield), and Size (log of market cap). Factor construction is proprietary to BlackRock and may differ from third parties' factor construction methodologies. Finally, we align the vectors and compute the cross sectional correlations between the ESG scores and factor scores.

Factors can be ESG friendly

ESG Score and Carbon Emission Intensity of Benchmark Factor Portfolios
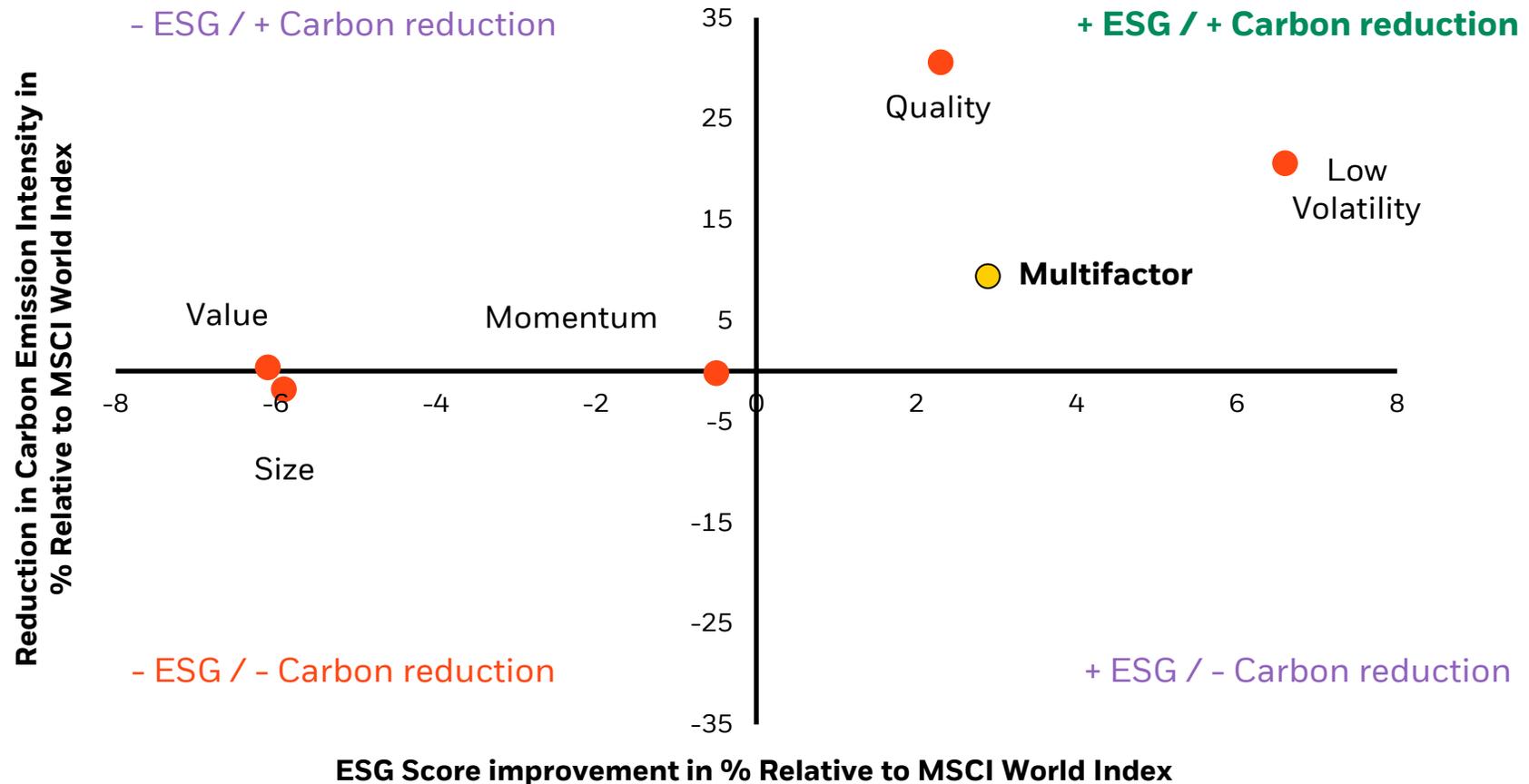
Source: BlackRock, May 2020. Data from Worldscope, IBES, MSCI ESG and Barra. Chan, Ying and Hogan, Ked and Schwaiger, Katharina and Ang, Andrew, ESG in Factors (January 19, 2020). Available at SSRN. The chart summarises the ESG and carbon scores of the benchmark factors relative to the MSCI World market portfolio over January 2015 to September 2019. The origin represents the market portfolio, so the ESG scores represent percentage improvements relative to the market on the x-axis and we plot percentage carbon emission reductions on the y-axis. Thus, those factors in the top right-hand quadrant represent factors that have improved ESG scores and lower carbon emissions than the market as represented by the MSCI World Index.

ESG and Carbon Outcomes: In-Sample Information Ratios

Comparison of Information Ratios of factor portfolios with and without a 20% ESG improvement and 40% carbon emission reduction versus benchmark:
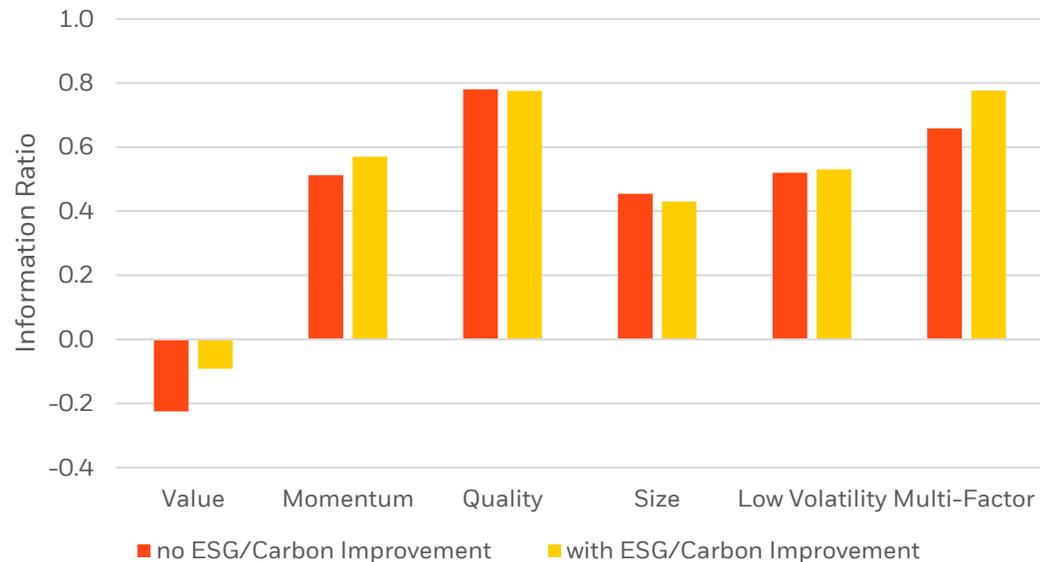
Source: BlackRock, as at September 2019. Chart shows the impact upon the information ratio of a portfolio due to ESG optimisation. Past performance is not indicative of future results. For illustrative purposes only.
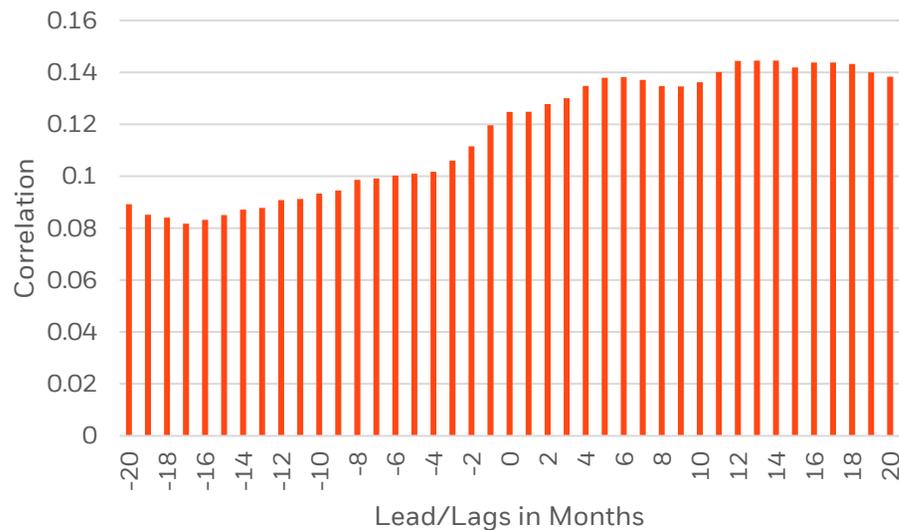
Intangible green value

Intangible Green Value

- **Patents are often the result of R&D spending and represent intangible human capital**

- **R&D spending typically increases before the patent is granted, and then continues to increase after:**

Relationship Between Patents and R&D Spending

Chart: Correlation (y-axis, 0 to 0.16) vs Lead/Lags in Months (x-axis, -20 to 20)

Source: BlackRock FBSG Research, as at September 2019. For illustrative purposes only.

Data

Global coverage of patents with a long history, dating back to at least 1980s.

Row	publication_number	application_number	country_code	kind_code	application_kind	application_number_formatted	pct_number	family_id	title_localized.text
1	AP-3114-A	AP-201206586-A	AP	A	A	AP201206586A		43736044	A method of synthesiting a complex [MN(NNS)2] active against the malaria parasite plasm
2	AT-A1002174-A	AT-1002174-A	AT	A	A	AT1002174A		11127854	Verfahren zur herstellung eines fachwerkartigen kuppelbaues aus beton und lehrgerust zu
3	AT-A110199-A	AT-110199-A	AT	A	A	AT110199A		3506622	Umladevorrichtung
4	AT-A110594-A	AT-110594-A	AT	A	A	AT110594A		3506701	Einsatzfahrzeug mit einer beleuchtungseinrichtung
5	AT-A110674-A	AT-110674-A	AT	A	A	AT110674A		3506712	Axial zusammenpressbarer dichtungsring
6	AT-A112492-A	AT-112492-A	AT	A	A	AT112492A		3507111	Vorrichtung zum vortreiben von tunnel und stollen
7	AT-A11672001-A	AT-11672001-A	AT	A	A	AT11672001A		3686473	Verfahren zur diagnose von nierenschädigungen im frühstadium durch messen der apoa-i

Key data items:

1. The patent identification number
2. Date it was published
3. Date it was filed
4. Assignee names – the company or person the patent is assigned
5. Citations
6. IPC/CPC code – a classification code of the patent
7. Patent text - in the localized language
8. Country it was filed

Entity name matching

One of the challenges with this data set, and many alternative data sets, is mapping entities (in this case we have both companies and individuals that published patents!) to companies.

We have approached this by:

- Normalize names through capitalization
- Remove any company suffixes (e.g. "Corp", "Co", "Inc.")
- Converts names to "trigrams"
- Measure the occurrence of these "trigrams" (tf–idf)
- Measure a form of similarity between these occurences (cosine)
- Select the entity that has the best match with a threshold

$$idf(d,t) = \log\left(\frac{n}{df(d,t)}\right) + 1$$
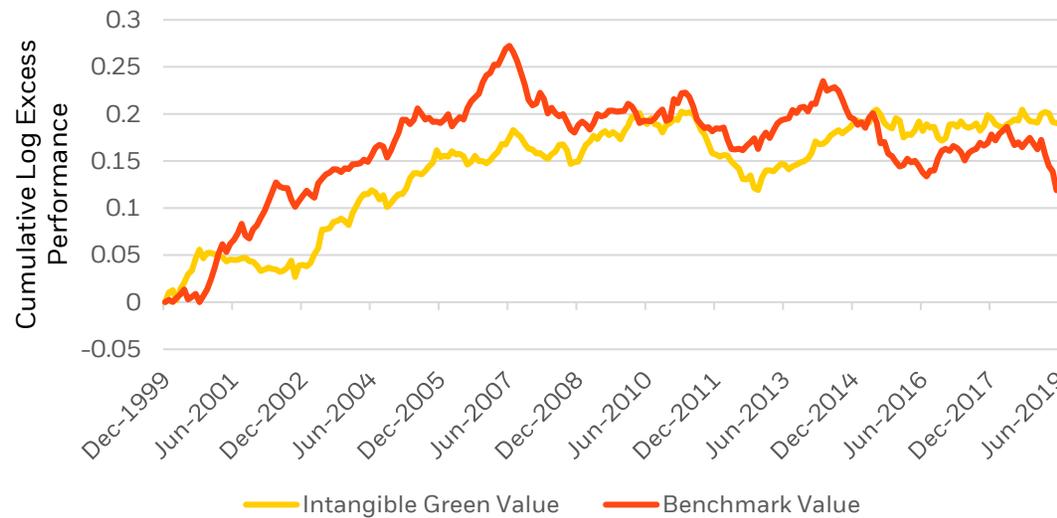
$$tfidf(d,t) = tf(t) \times idf(d,t)$$

$$\cos(a,b) = \frac{ab}{\|a\|\|b\|} = \frac{\sum_{i=1}^{n} a_i b_i}{\sqrt{\sum_{i=1}^{n}(a_i)^2}\sqrt{\sum_{i=1}^{n}(b_i)^2}}$$

Source: BlackRock FBSG Research, as at September 2019. For illustrative purposes only.

Intangible Green Value

Green patents not only represent important priorities for society, but highly profitable, albeit risky, opportunities:

Source: BlackRock FBSG Research, as at September 2019. For illustrative purposes only.

Corporate culture quality

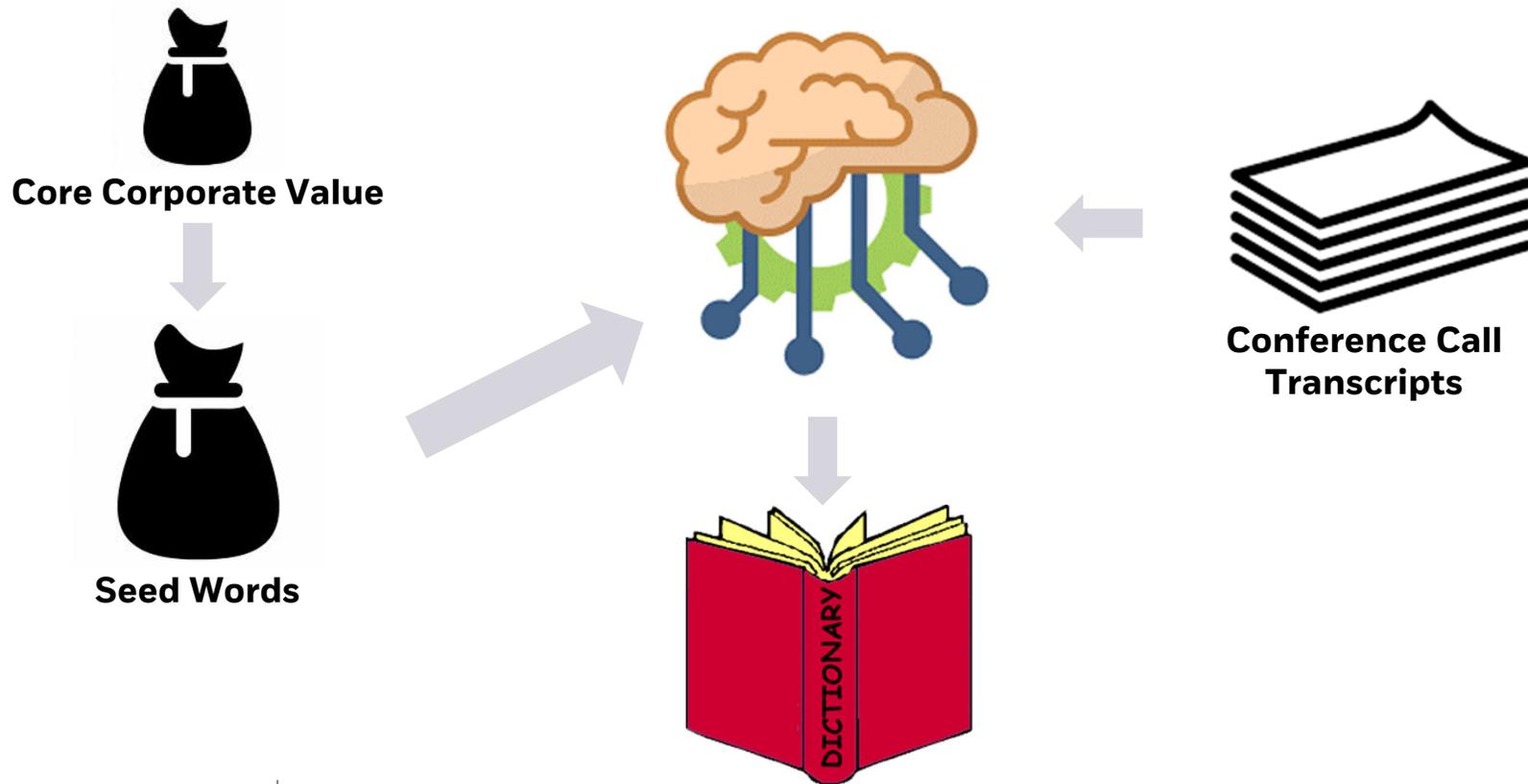# Corporate Culture Quality

Innovation

Integrity

Quality

Respect

Teamwork

For illustrative purposes only.

Measuring Corporate Culture using Machine Learning

Core Corporate Value

Seed Words

Conference Call Transcripts

Core Corporate Values	Seed Words
Innovation	Creativity, Excellence, Passion, Pride, Leadership, Growth, Performance, Efficiency, Results, Innovation
Integrity	Integrity, Ethics, Accountability, Honesty, Fairness, Responsibility, Transparency
Quality	Quality, Customer, Commitment, Dedication, Value, Expectations
Respect	Respect, Diversity, Inclusion, Development, Talent, Employees, Dignity, Empowerment
Teamwork	Teamwork, Collaboration, Cooperation

Source: Chan, Y., Hogan, K., Schwaiger, K., Ang, A. "ESG in Factors" 2020. Available at: https://papers.ssrn.com/abstract_id=3522354 For illustrative purposes only. This material is not intended to be relied upon as a forecast, research or investment advice, and is not a recommendation, offer or solicitation to buy or sell any securities or financial product or to adopt any investment strategy. The opinions expressed are as of May 2020 and may change as subsequent conditions vary.
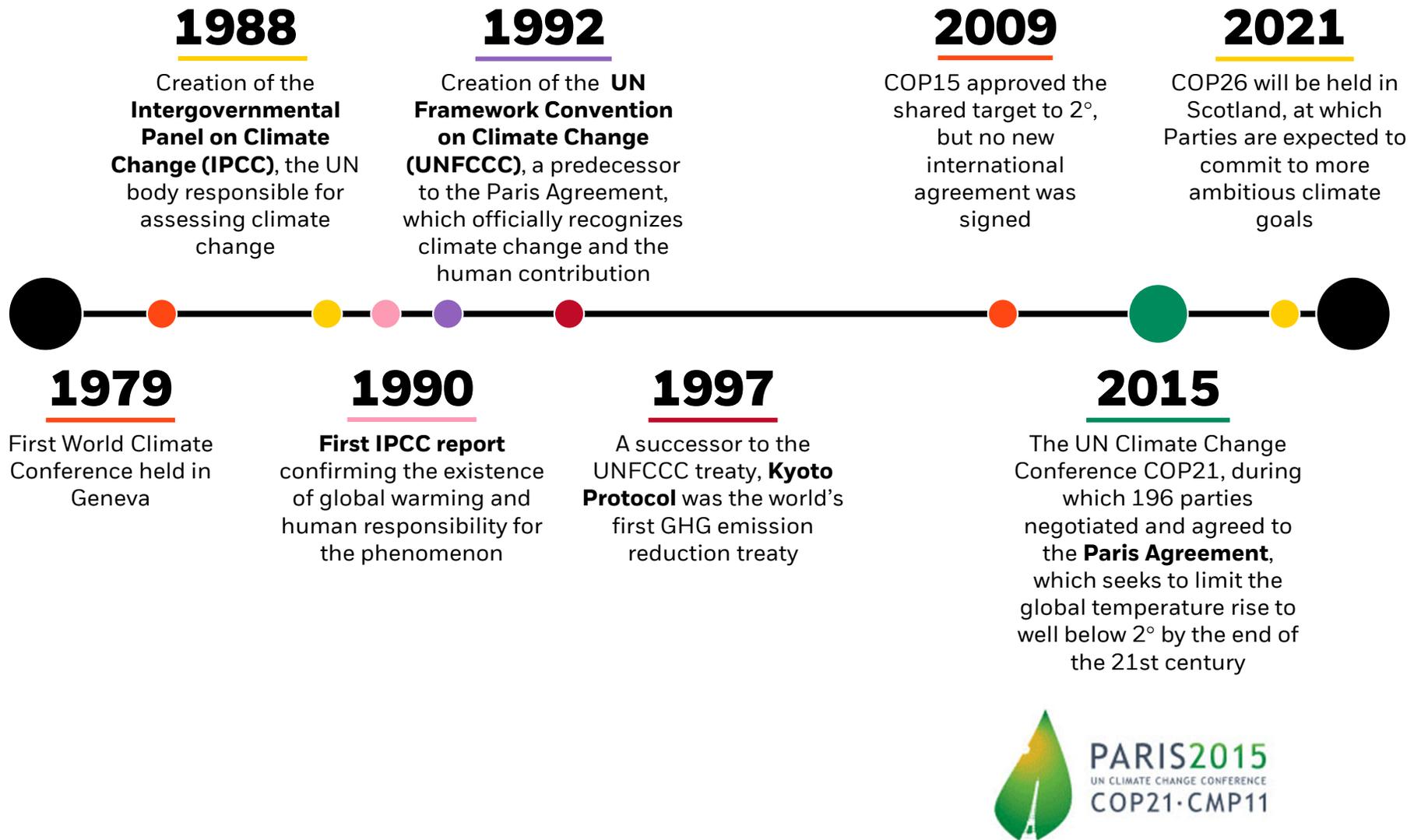
Corporate Culture Quality

Corporate Culture Quality
Cumulative Performance

Legend: Corporate Culture Quality | Benchmark Quality
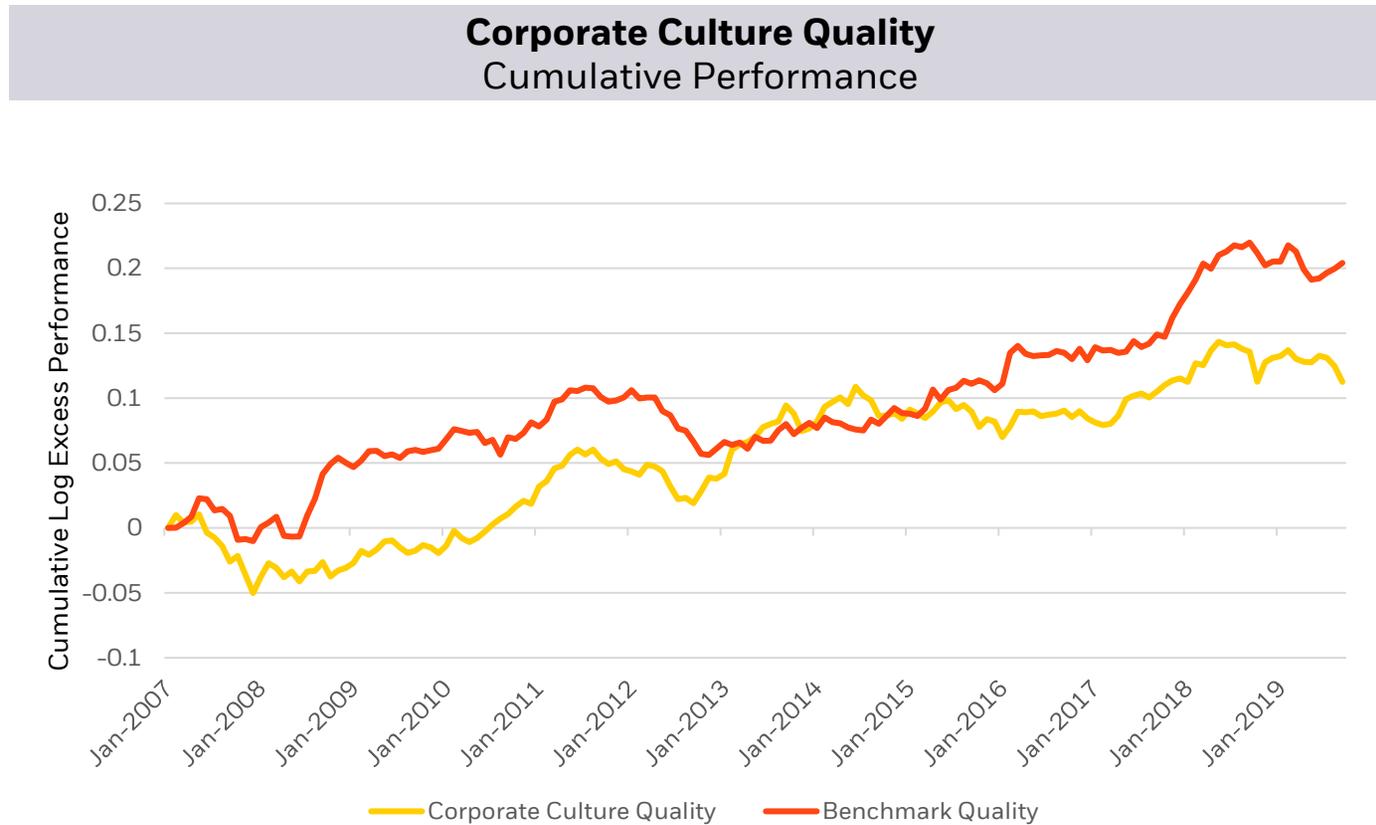
Source: BlackRock FBSG Research, as at September 2019. For illustrative purposes only.

Climate alpha

A long time in the making

1988

Creation of the **Intergovernmental Panel on Climate Change (IPCC)**, the UN body responsible for assessing climate change

1992

Creation of the **UN Framework Convention on Climate Change (UNFCCC)**, a predecessor to the Paris Agreement, which officially recognizes climate change and the human contribution

2009

COP15 approved the shared target to 2°, but no new international agreement was signed

2021

COP26 will be held in Scotland, at which Parties are expected to commit to more ambitious climate goals

1979

First World Climate Conference held in Geneva

1990

First IPCC report confirming the existence of global warming and human responsibility for the phenomenon

1997

A successor to the UNFCCC treaty, **Kyoto Protocol** was the world's first GHG emission reduction treaty

2015

The UN Climate Change Conference COP21, during which 196 parties negotiated and agreed to the **Paris Agreement**, which seeks to limit the global temperature rise to well below 2° by the end of the 21st century

PARIS2015
UN CLIMATE CHANGE CONFERENCE
COP21·CMP11

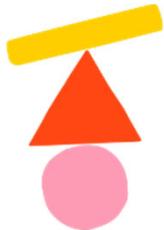Source: BlackRock, December 2021. For illustrative purposes only.

The Paris Agreement

Aims of the Paris Agreement

2 Degrees

Limit the increase in global temperatures to **well below 2°C** above pre-industrial levels, and pursue efforts **to limit the increase to 1.5°C**.

Adapt

Increase countries' **ability to adapt** to the adverse impacts of climate change

Flows

Aim to make finance flows **consistent with a pathway toward low GHG emissions** and climate-resilient development

Investment guidelines

Source: The United Nations' 2015 Paris Agreement.

Source: European Commission, Institutional Investors Group on Climate Change

Climate is imperative for the whole portfolio

Position for **opportunities**	Mitigate **risk**	Align with a **net-zero** future

The opportunities and risks presented by the climate transition exist across every asset classes

- Our research focuses on preparing portfolios for the climate transition, bringing a net-zero mindset to equities, nominal and inflation-linked government bonds, IG and HY credit, property, and commodities

1. Tilt into the companies, countries, and commodities best prepared for the transition

Align portfolios with climate objectives, seek incremental returns, mitigate risk

2. Decarbonise across asset classes

Reduce greenhouse gas emissions and commit to an ongoing annual decarbonisation, moving portfolios towards a net zero future

3. Maintain broad market exposures

Avoid the worst offenders but otherwise maintain a portfolio diversified across sectors, geographies, and asset classes

Source: BlackRock, December 2021. For illustrative purposes only.

Companies with the highest emission intensity among their peers significantly underperform.

Scope 1&2 emission intensity: A company's most recently reported or estimated scope 1 and 2 greenhouse gas (GHG) emissions (in metric tons) scaled by revenues (in million USD)

- Negative relationship between emission intensity and operating profitability

- Increasing sensitivity towards external events on climate change

Long Bottom 30%, Short Top 30% (value-weighted)

High climate impact — Low climate impact
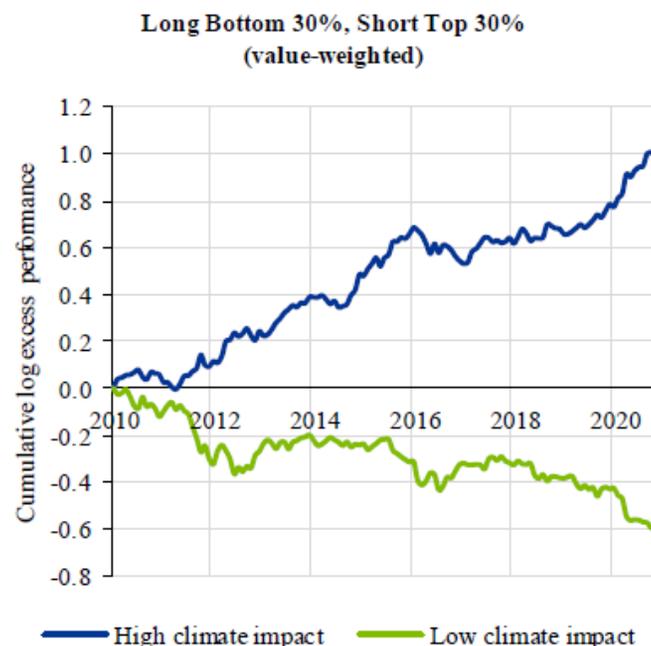
Source: BlackRock, FBSG as at 30/06/2020. Research in this document has been produced and may be acted on by BlackRock for its own purposes. The views expressed do not constitute investment advice and are subject to change.

A different academic view

Journal of Financial Economics

ELSEVIER

Do investors care about carbon risk?

Patrick Bolton [a, b] ✉, Marcin Kacperczyk [a, b] ✉

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Abstract

We study whether carbon emissions affect the cross-section of US stock returns. We find that stocks of firms with higher total carbon dioxide emissions (and changes in emissions) earn higher returns, controlling for size, book-to-market, and other return predictors. We cannot explain this carbon premium through differences in unexpected profitability or other known risk factors. We also find that institutional investors implement exclusionary screening based on direct emission intensity (the ratio of total emissions to sales) in a few salient industries. Overall, our results are consistent with an interpretation that investors are already demanding compensation for their exposure to carbon emission risk.

Source: BlackRock, December 2021. For illustrative purposes only.

Cross-Sectional Regressions with Carbon Emission

Panel A: Predictive Regressions

Intercept	0.0910*	0.0918*	0.0915*
LOGS12TOT	-0.0000		
S12CHG		-0.0004	
S12INT			-0.0001***
LOGSIZE	-0.0003	-0.0003	-0.0004
BM	0.0005	0.0005	0.0006
LEVERAGE	-0.0020	-0.0020	-0.0018
ROE	0.0007	0.0007	0.0005
MOM	-0.0184	-0.0180	-0.0181
INVEST_A	-0.0227*	-0.0225*	-0.0215*
LOGPPE	-0.0001	-0.0002	0.0000
VOLAT	0.0319*	0.0320*	0.0315
Month-Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Observations	203,799	203,799	203,799
R-squared	0.2297	0.2297	0.2297

This table summarized the results from estimating regressions of stock returns on emission measures. The sample period is January 2010 to December 2020. The dependent variable is RET. The main independent variables are log Scope 1&2 total emissions (LOGS12TOT), the year-on-year growth in Scope 1&2 emissions (S12CHG), and Scope 1&2 emission intensities (S12INT). All variables are defined in Section 1.1. We report the results of pooled OLS regression with standard errors clustered at company and year level. All regressions include month-year, industry, and country fixed effects. *, **, and *** indicate statistical significance at 10%, 5%, and 1% levels, respectively.

Cross-Sectional Regressions with Carbon Emission

Panel B: Contemporaneous Regressions

Intercept	0.0493***	0.0484***	0.0483***
LOGS12TOT	0.0001		
S12CHG		-0.0002	
S12INT			-0.0000
LOGSIZE	-0.0038***	-0.0038***	-0.0038***
BM	0.0070***	0.0071***	0.0071***
LEVERAGE	-0.0129***	-0.0129***	-0.0128***
ROE	0.0452***	0.0452***	0.0452***
MOM	-0.0359	-0.0360	-0.0360
INVEST_A	-0.0483***	-0.0483***	-0.0479***
LOGPPE	0.0015***	0.0016***	0.0016***
VOLAT	0.0379	0.0380	0.0377
Month-Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Observations	221,366	221,366	221,366
R-squared	0.2092	0.2092	0.2092

This table summarized the results from estimating regressions of stock returns on emission measures. The sample period is January 2010 to December 2020. The dependent variable is RET. The main independent variables are log Scope 1&2 total emissions (LOGS12TOT), the year-on-year growth in Scope 1&2 emissions (S12CHG), and Scope 1&2 emission intensities (S12INT). All variables are defined in Section 1.1. We report the results of pooled OLS regression with standard errors clustered at company and year level. All regressions include month-year, industry, and country fixed effects. *, **, and *** indicate statistical significance at 10%, 5%, and 1% levels, respectively.

# Predicting Firm Efficiency with Carbon Emission Intensity

Independent variable	COC	GROSSPROFIT	ROA	TOBIN
Intercept	0.0960***	0.9793***	0.0115	0.9480***
S12INT	0.0000	-0.0032***	0.0001	0.0002
LOGSIZE	-0.0016*	-0.0519***	0.0066***	0.1509***
BM	0.0093***	-0.1236***	-0.0096***	-0.6654***
LEVERAGE	0.0352***	-0.3407***	-0.0717***	-0.4770***
ROE	-0.0375***	0.3610***	0.1587***	1.2629***
MOM	-0.0567**	0.0163	0.1225***	0.7154**
INVEST_A	0.0279	-0.2500	0.0846***	2.7981***
LOGPPE	0.0011	0.0248***	-0.0059***	-0.1428***
VOLAT	0.2121***	0.2131*	-0.0843***	0.0692
Year/month FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Observations	141,839	141,839	141,839	141,839
R-squared	0.3316	0.5910	0.4465	0.5985

This table summarized the results from estimating regressions of firm-level financial performance measures on Scope 1&2 emission intensities (S12INT). The sample period is January 2009 to December 2020. The dependent variables are either implied cost of capital (COC), gross profitability (GROSSPROFIT), return on assets (ROA), or Tobin's Q (TOBIN). We report the results of pooled OLS regression with standard errors clustered at company and year level. All regressions include month-year, industry, and country fixed effects. *, **, and *** indicate statistical significance at 10%, 5%, and 1% levels, respectively.

Key takeaways

Yes, this time can be different!

- Low emission intensity reflects the **quality** of a company, i.e., higher operating performance and competitive advantages that arise from structural changes in production and processes

- Quality has historically been defensive, performing well when the macroeconomic environment has been weak. The proposed signal shows some similar crisis resistance, with good performance during the most recent market shakedown due to Covid-19
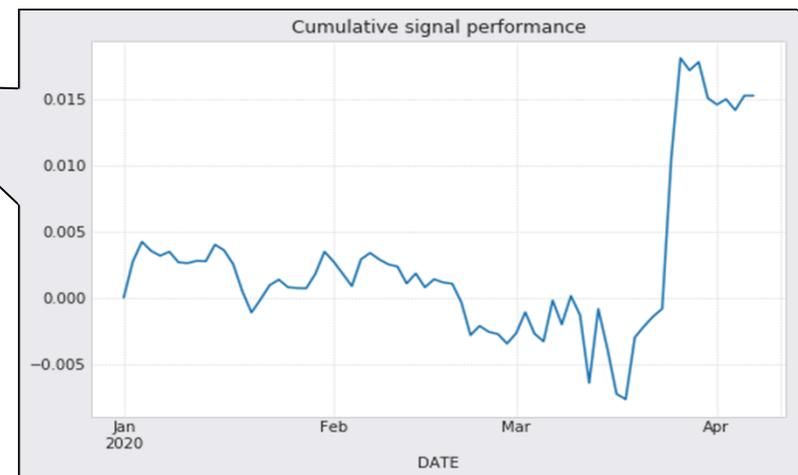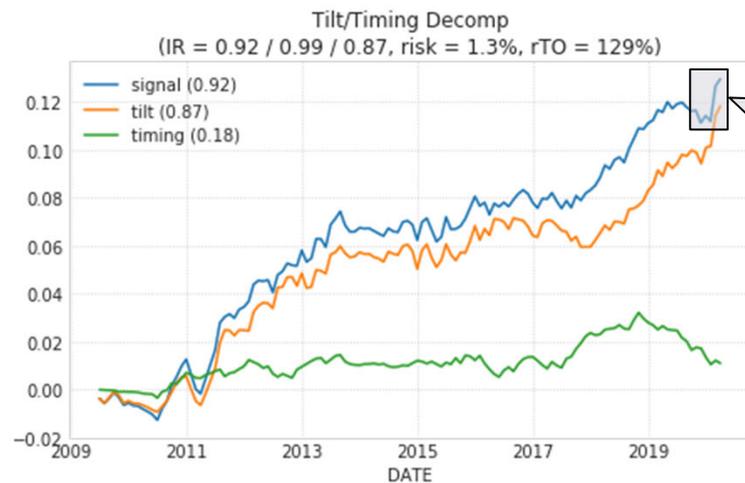
- The proposed signal shows that **it pays off to "go green"**

Source: BlackRock, 2021. Research in this document has been produced and may be acted on by BlackRock for its own purposes. The views expressed do not constitute investment advice and are subject to change.

Net zero investing

Hodges, P., H. Ren, K. Schwaiger, and A. Ang, 2021, Net Zero Investing for Multi-Asset Portfolios Seeking to Satisfy Paris Aligned Benchmark Requirements with Climate Alpha Signals, forthcoming Journal of Portfolio Management
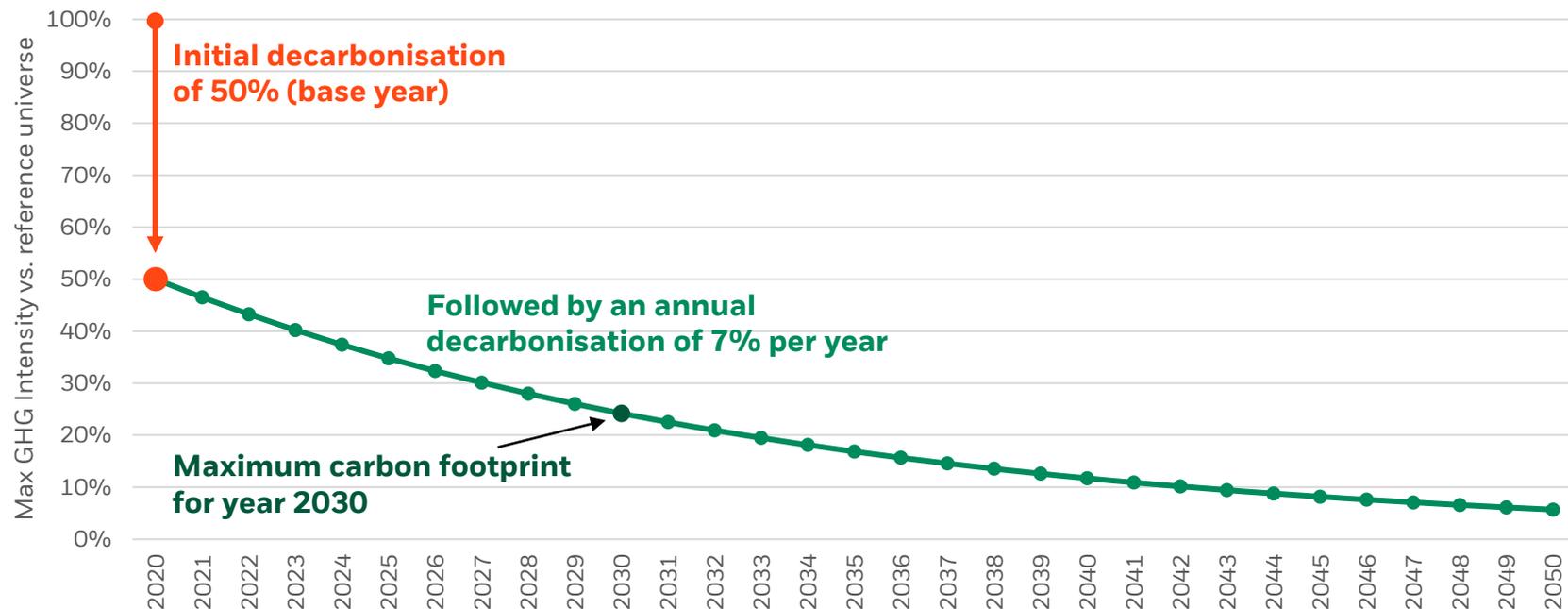https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4005308

Ang, A., J. Kilburn, K. Schwaiger, J. Snow, and V.-S. Wendt, 2021 Active Paris Aligned Equity Investing, to appear in Jurczenko, E., "Climate Investing"

Decarbonisation in practice

1 Lower GHG intensity

An initial decrease in GHG intensity by **50%** (using Scope 1+2+(3)) relative to the reference universe

2 Self-decarbonisation

Every year after: on average, a **7%** GHG intensity reduction p.a. in line with or beyond the IPCC's 1.5° scenario with limited or no overshoot

Illustrative decarbonization path of a portfolio

Initial decarbonisation of 50% (base year)

Followed by an annual decarbonisation of 7% per year

Maximum carbon footprint for year 2030

Max GHG Intensity vs. reference universe

Source: BlackRock, as of December 2021. This graph is for illustrative purposes only, meant to illustrate visually the impact to a portfolio's GHG intensity in response to an initial 50% reduction followed by an annual 7% reduction in subsequent years. We assume a starting GHG intensity equal to that of the reference universe (I_0 = 100%). We cut the carbon intensity by 50% in year 1 (I_1 = 50%), and then reduce the GHG intensity by an additional 7% each subsequent year until 2050 ($I_t = I_{t-1}$*(100%-7%)). This decarbonization path is not representative of an actual portfolio or strategy.

Governed by science-based guidelines

We leverage the EU Technical Expert Group's Paris-Aligned Benchmark guidelines to construct a transition-ready portfolio and target a net-zero outcome

Risk-oriented

Lower GHG intensity

Relative decrease in GHG intensity by 50% (using Scope 1+2+(3))

Required exclusions

Baselines and climate-related activities

Opportunity-oriented

Self-de-carbonisation

At least 7% GHG intensity reduction on average p.a.

Corporate target setting

Weight increase for evidence-based targets

Exposure constraints

Minimum exposure to 'high impact' sectors

Green-to-brown share

Significant relative increase (voluntary)

Source: *Report on Benchmarks*: EU Technical Expert Group on Sustainable Finance – Paris Aligned Benchmarks. September 2019

Paris-aligned equities: methodology

Developed Large Cap

Small Cap

Emerging Markets

■	Industry-adjusted ESG Scores	60%
■	Emissions-to-sales (Scope 1&2)	20%
■	Green Patents to Assets	10%
■	Corporate Target Setting (SBTi)	10%

Baseline, Activity

Screens applied to avoid exposure to certain harmful practices and/or activities

---

50%

Reduction in carbon intensity relative to the investment universe

---

7%

Per annum decarbonization following the initial 50% reduction

---

Zero

Underweighting of high climate impact sectors. The portfolio's NACE sector exposures must be greater than or equal to the benchmark to avoid greenwashing

---

1%

Target active risk relative to the benchmark

5%

Maximum sector and/or country deviation from the benchmark

2%

Maximum security weight relative to the benchmark

Source: BlackRock, December 2021. The environmental, social and governance ("ESG") considerations discussed herein may affect an investment team's decision to invest in certain companies or industries from time to time. Results may differ from portfolios that do not apply similar ESG considerations to their investment process.

Incorporating climate-aware alphas

## Carbon emission intensity (emissions to sales)

- Companies with lower carbon emission intensity tend to be characterized by higher productivity with greater operational efficiency

- We find that companies with lower carbon intensity than their peers have historically outperformed

- Our portfolio over (under) weights those companies with lower (higher) emissions intensity relative to peers
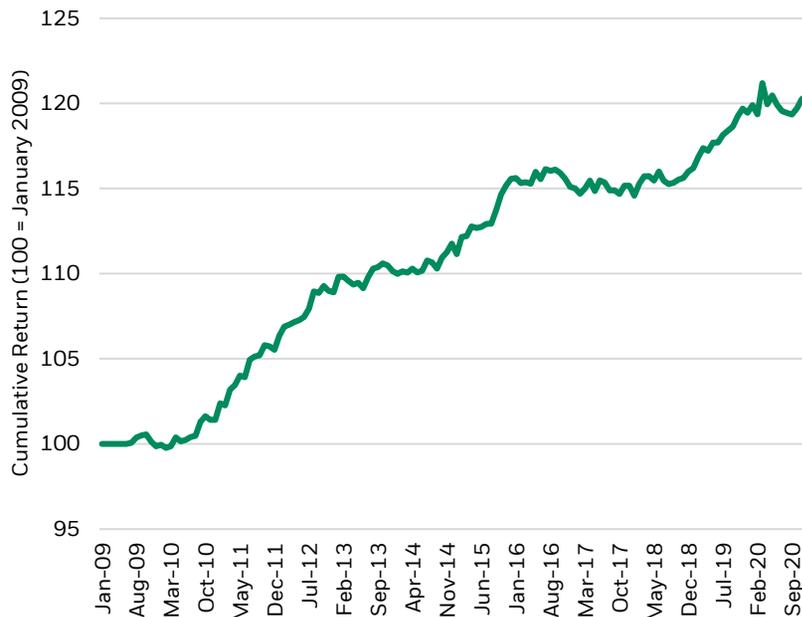
Source: BlackRock. Chart shows the performance of a hypothetical long/short global equity portfolio that goes long (short) companies with low (high) carbon intensity (measured as emissions-to-sales), controlling for industry and size exposures. Analysis period: Jan 2009 – Dec 2020.

Green patents

- Green patents foster sustainable economic growth and may signal opportunities for climate-related investments

- A higher number of green patent filings may indicate better preparedness for the transition to a green economy

- Our portfolio over (under) weights those companies with a relatively higher (lower) number of green patent filings relative to peers
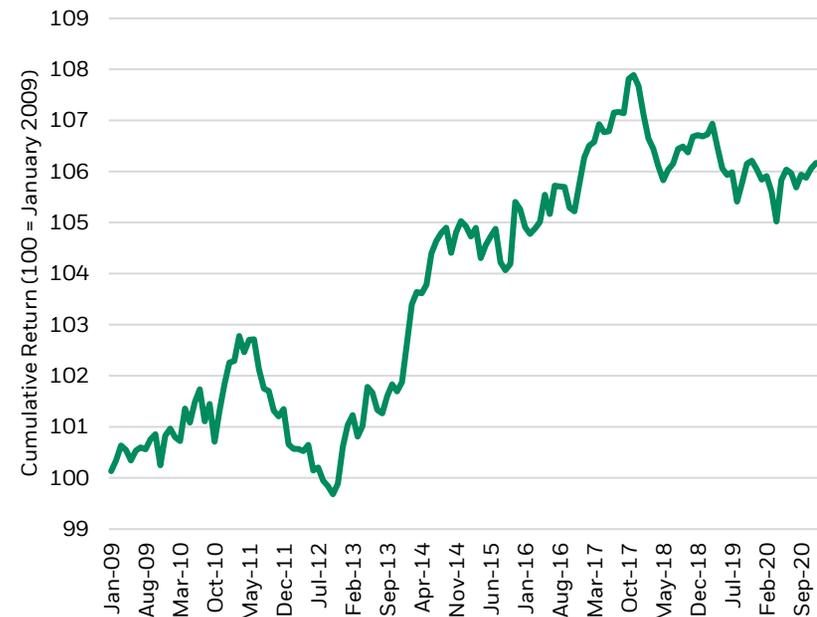

Source: BlackRock. Chart shows the performance of a hypothetical long only global equity portfolio that over (under) weights companies with a high (low) number of green patent filings, controlling for industry and size exposures. Analysis period: Jan 2009 –Dec 2020.

The additivity of alpha insights

Performance comparison: Paris-aligned portfolios with and without alpha insights

Incorporating alpha insights can provide incremental returns while maintaining alignment with the goals of the Paris Agreement
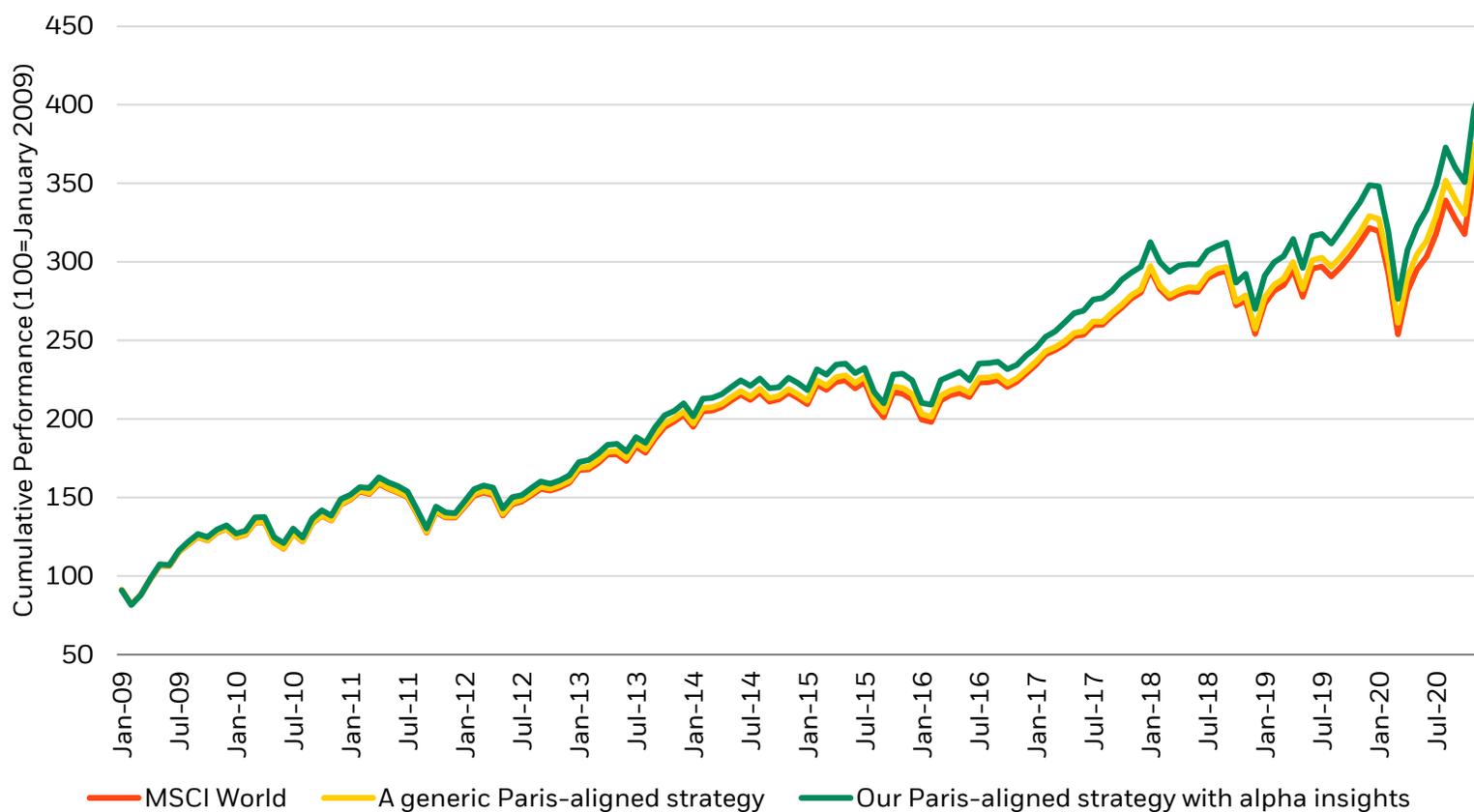
Legend: — MSCI World — A generic Paris-aligned strategy — Our Paris-aligned strategy with alpha insights

Y-axis: Cumulative Performance (100=January 2009)

Bringing it all together: improved returns

Paris-aligned equities

- **Optimizes climate-aware alphas**
  - Climate-aware alphas incorporate information on ESG scores, carbon intensity, green patents, and SBTi commitments
- **Applies relevant baseline and activity exclusions**
- **Implements relative and self-decarbonisation targets**
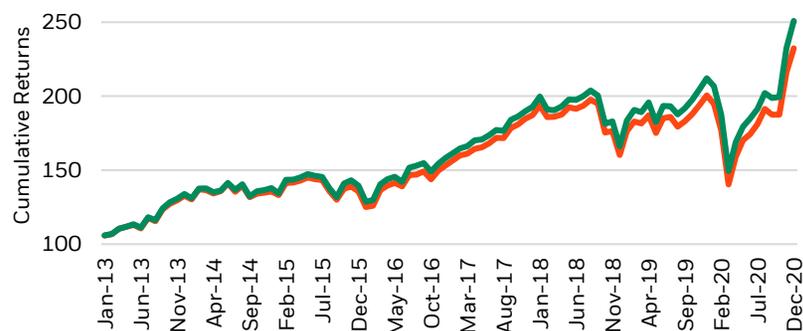- **Recognises exposure constraints**

The following graphs show the **<u>returns</u>** for the **benchmark** vs. the simulated **Paris-aligned portfolio**
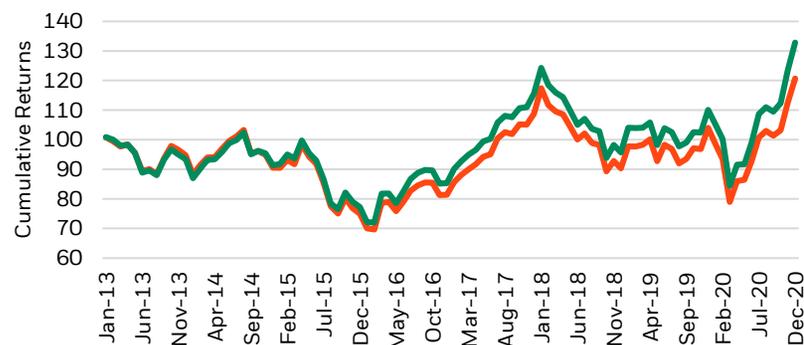
MSCI World
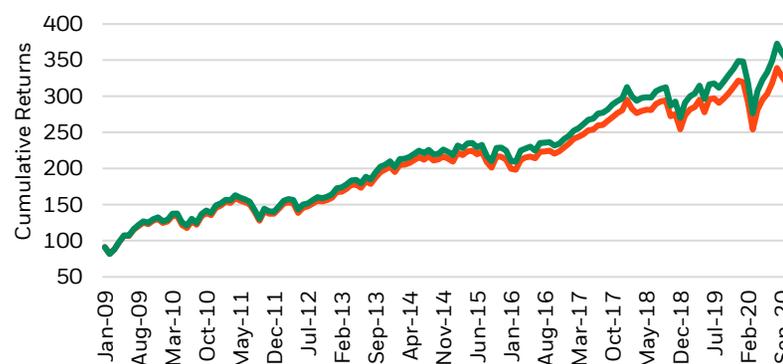
Performance of simulated Paris-aligned alpha-optimized long-only portfolio in MSCI World universe, with 1% annualised tracking error target, and security, country, and industry exposure constraints.

MSCI World Small Cap

Performance of simulated Paris-aligned alpha-optimized long-only portfolio in MSCI World Small Cap universe, with 1% annualised tracking error target, and security, country, and industry exposure constraints.

MSCI Emerging Markets

Performance of simulated Paris-aligned alpha-optimized long-only portfolio in MSCI EM universe, with 1% annualised tracking error target, and security, country, and industry exposure constraints.

Focus on Corporate Target Setting: Forward Looking Indicators

Science Based Targets (SBTI)

As of November 2021, **over 2000 companies** have voluntarily set climate targets.

SBTI defines and promotes science–based target setting by companies:

- **Assists companies** in setting decarbonization targets that are in line with the latest climate science in order to meet the goals of the Paris Agreement
- **Provides technical assistance** and expert resources to companies who set science-based targets in line with the latest climate science
- Brings together a team of experts to provide companies with **independent assessment and validation of targets**

Source: BlackRock and sciencebasedtargets.org as of November 2021.

Analysing Science Based Targets

The number of companies making science based targets has increased across a wide range of sectors and countries

Legend: 1.5°C — 2°C — Well-below 2°C — Committed — Total
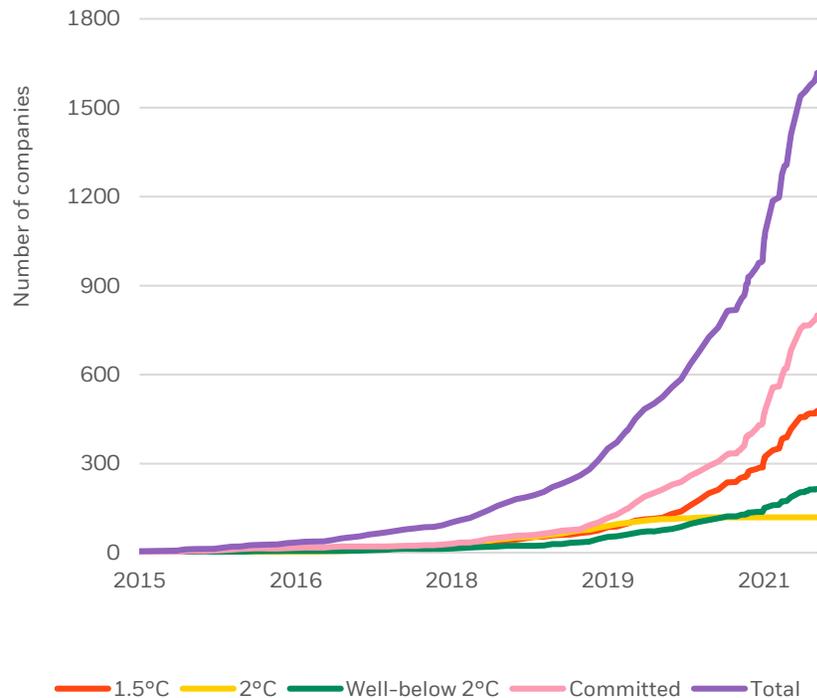
Source: BlackRock and sciencebasedtargets.org as of February July, 2021. Target Qualification can be 1.5C, 2C, WB2C (well below 2C) and Committed (not specified).

And firms with pledges have significantly lower carbon intensity than peers

Legend: Pledged, One Year out, Two Years out, All Companies

> " SBTi companies deliver on emissions cuts: **companies with science–based targets have reduced their combined emissions by 25% since 2015,** contrasting with an *increase* of 3.4% in global emissions from energy and industrial processes over the same period "
> – *Science Based Targets Initiative, Jan 2021*

Source: BlackRock and sciencebasedtargets.org as of January 2021. Demonstrates the average carbon intensity of companies one and two years following their pledges, compared to the average of all companies in the universe.
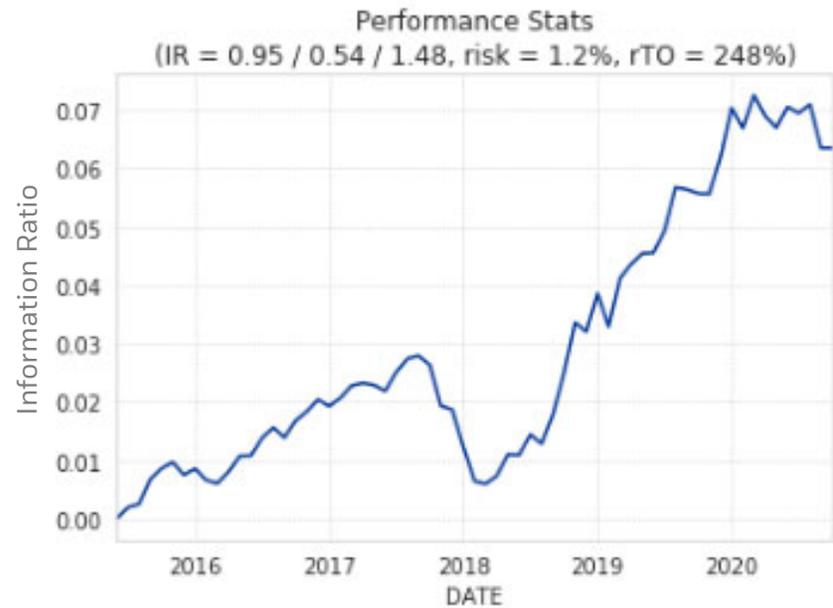
Analysing Science Based Targets

Companies with pledges have higher levels of Gross Profitability

All companies
Companies with SBTI pledges
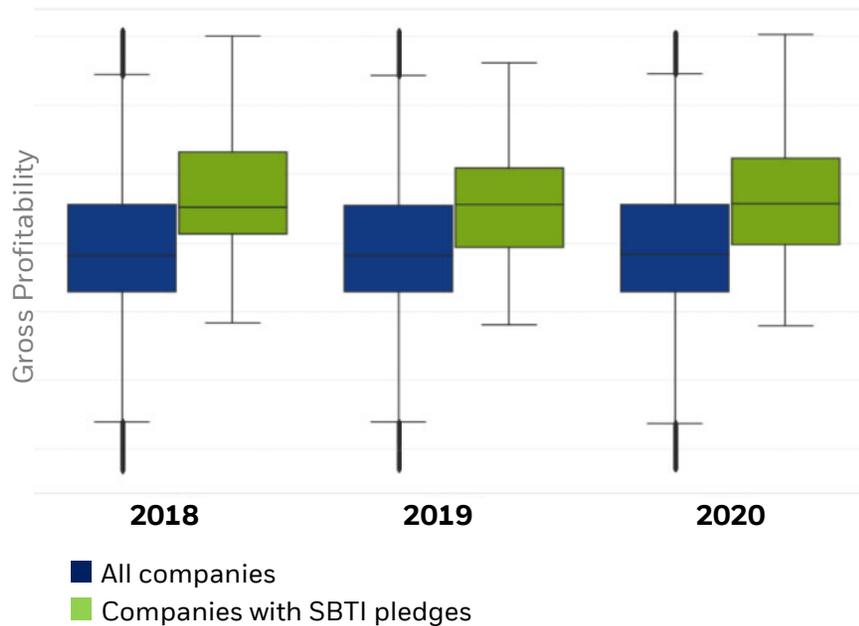
Source: BlackRock and sciencebasedtargets.org, 2021.

And companies with pledges have subsequently outperformed those without

Source: BlackRock as of December 2020. Simulation period from Jan 2015 – Dec 2020 based on a hypothetical long/short global equity portfolio. Companies with 1.5C, 2C and WBC get a score of 2, Committed a score of 1 and all others a score of zero. Does not reflect that actual returns of any fund or strategy. For illustrative purposes only

Key takeaways

Setting targets matters!

- The rate of adoption of science-based climate commitments has doubled in 2020. We expect this acceleration to continue in the next two years

- SBTi companies are **quality** companies: they have higher gross profitability than their peers. Not only are those companies publicly disclosing their emissions and targets but they also seem to be more stable in financial terms

- SBTi companies have lower current carbon emission than their peers, but most importantly they also have **lower carbon emissions into the future**. Setting a goal is therefore not only a public display but also suggests active improvements

Net zero multi-asset investing

Hodges, P., H. Ren, K. Schwaiger, and A. Ang, 2021, Net Zero Investing for Multi-Asset Portfolios Seeking to Satisfy Paris Aligned Benchmark Requirements with Climate Alpha Signals, forthcoming Journal of Portfolio Management
https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4005308

Kaul, K., K. Schwaiger, M. Si, and A. Ang, 2021, Sustainable Alpha in Sovereign and Corporate Bonds, forthcoming Journal of Investment Management
https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3998568

Schwaiger, K., M. Si, and J. Kilburn, 2022, Addressing Climate Change in Sovereign Bond Portfolios, BlackRock and ClimateTRACE

Government Bonds

**Scope:** Nominal and Inflation-linked Government Debt (DM and EM)

Guidelines: Institutional Investors Group on Climate Change (IGCC)

Data: Climate Change Performance Index (CCPI)[1]

Portfolio Construction:

1. Start with an equal-weighted portfolio of the current investible universe

2. Tilt the portfolio toward higher performing issuers relative to the benchmark, based on CCPI[1] data assessing GHG Emissions, Renewable Energy, Energy Use, and Climate Policy

3. Target an annual decarbonization

4. Maintain a similar duration profile

5. Consider an allocation to green bonds (DM)

DM Active Bond Weights[2]
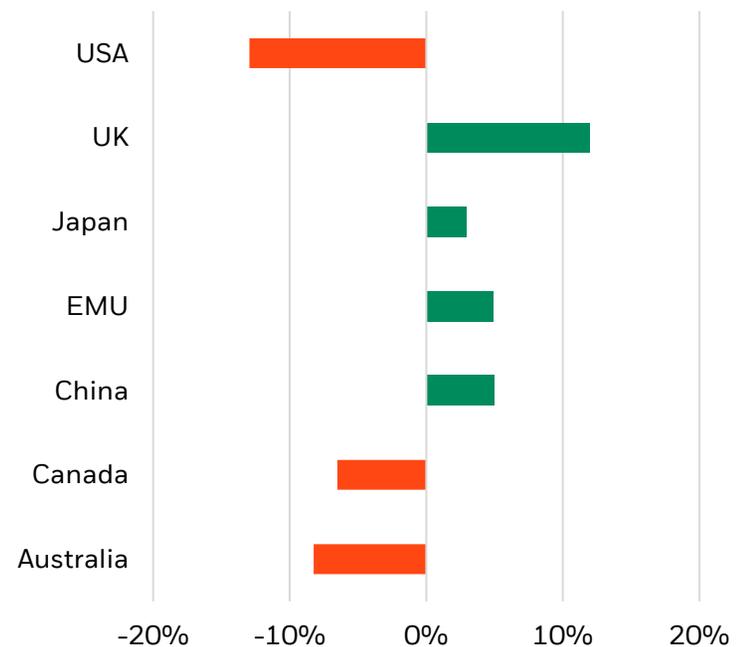
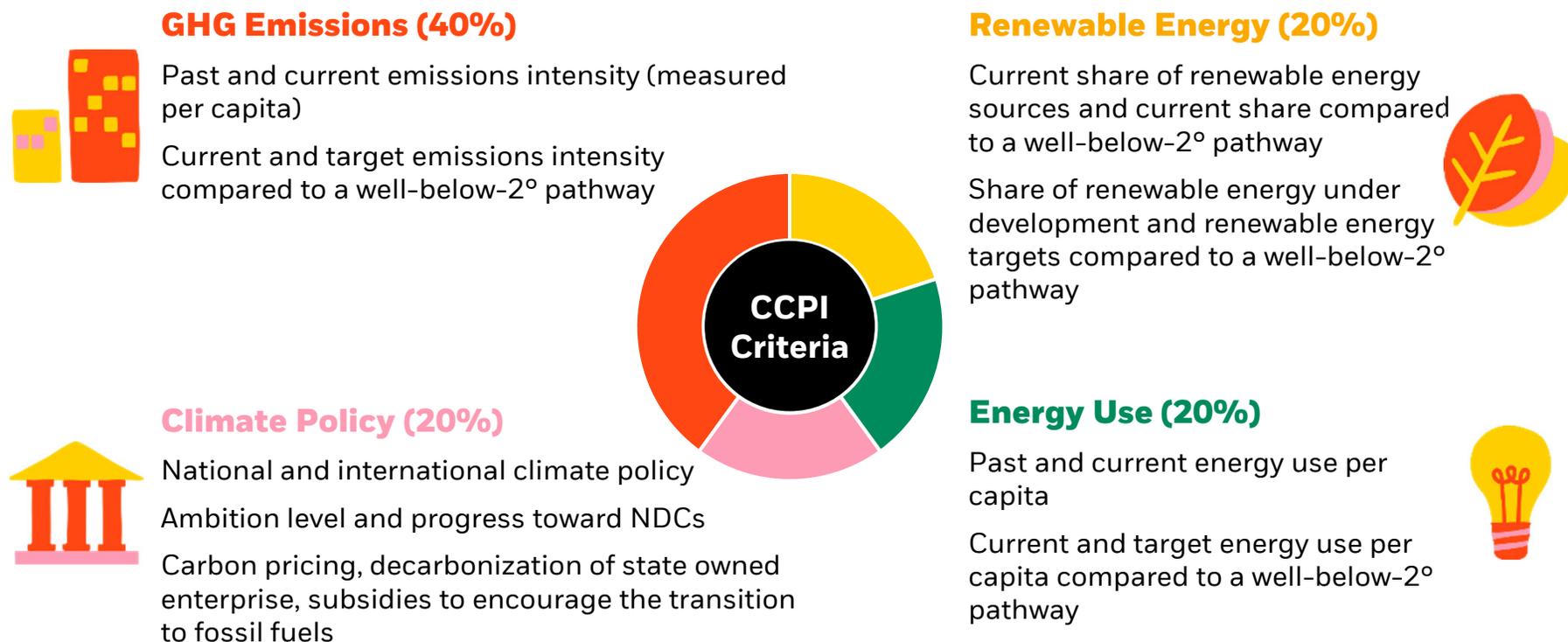1. For additional detail on the Germanwatch CCPI data, please see the following slide

2. Source: BlackRock. Active weights relative to current Market Advantage weights. As of November 2021

Additional Information on CCPI Data

CCPI is an independent monitoring tool which tracks countries' efforts to combat climate change

- Published annually
- Recommended data source for sovereign bonds per the IIGCC Net Zero Investment Framework.

Components of the CCPI

GHG Emissions (40%)

Past and current emissions intensity (measured per capita)

Current and target emissions intensity compared to a well–below–2° pathway

Renewable Energy (20%)

Current share of renewable energy sources and current share compared to a well–below–2° pathway

Share of renewable energy under development and renewable energy targets compared to a well–below–2° pathway

CCPI Criteria

Climate Policy (20%)

National and international climate policy

Ambition level and progress toward NDCs

Carbon pricing, decarbonization of state owned enterprise, subsidies to encourage the transition to fossil fuels

Energy Use (20%)

Past and current energy use per capita

Current and target energy use per capita compared to a well–below–2° pathway

Source: Germanwatch CCPI Background and Methodology
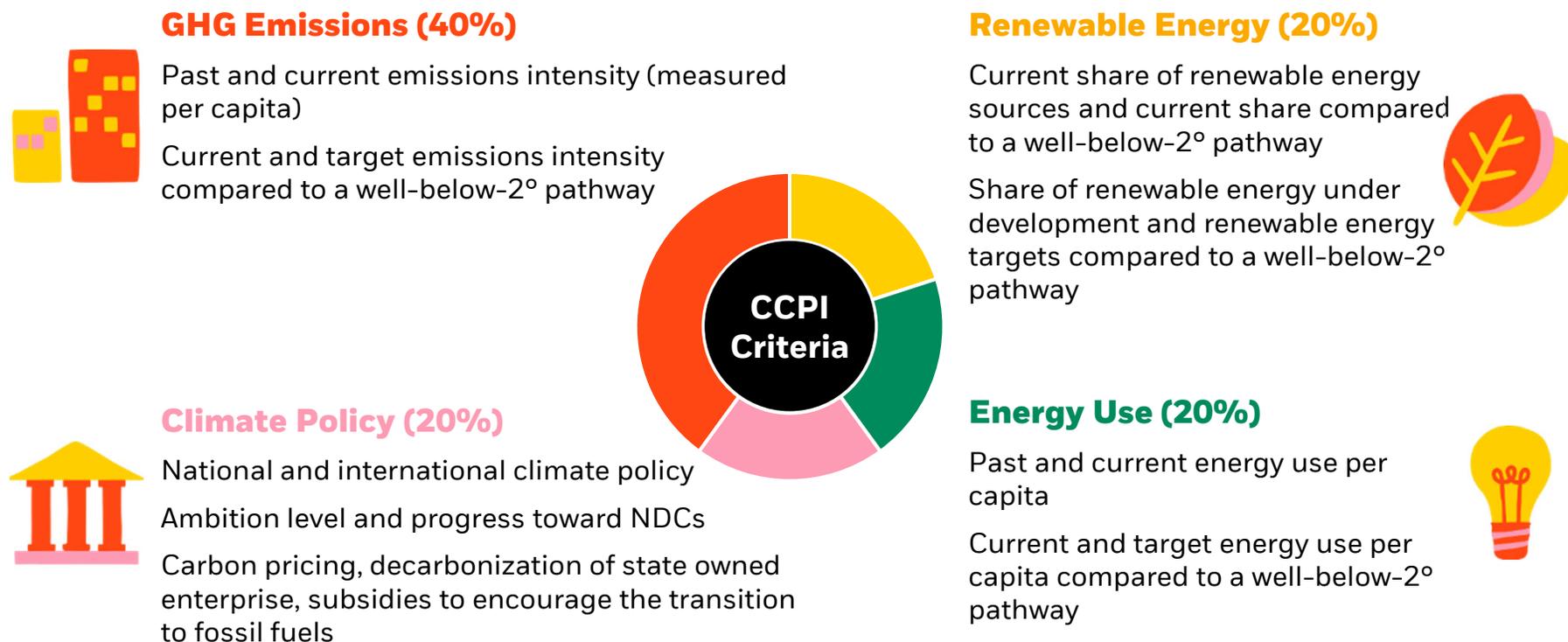
Climate TRACE

Source: climatetrace.org, 2021.

The Climate Change Performance Index (CCPI)

CCPI is an independent monitoring tool which tracks countries' efforts to combat climate change
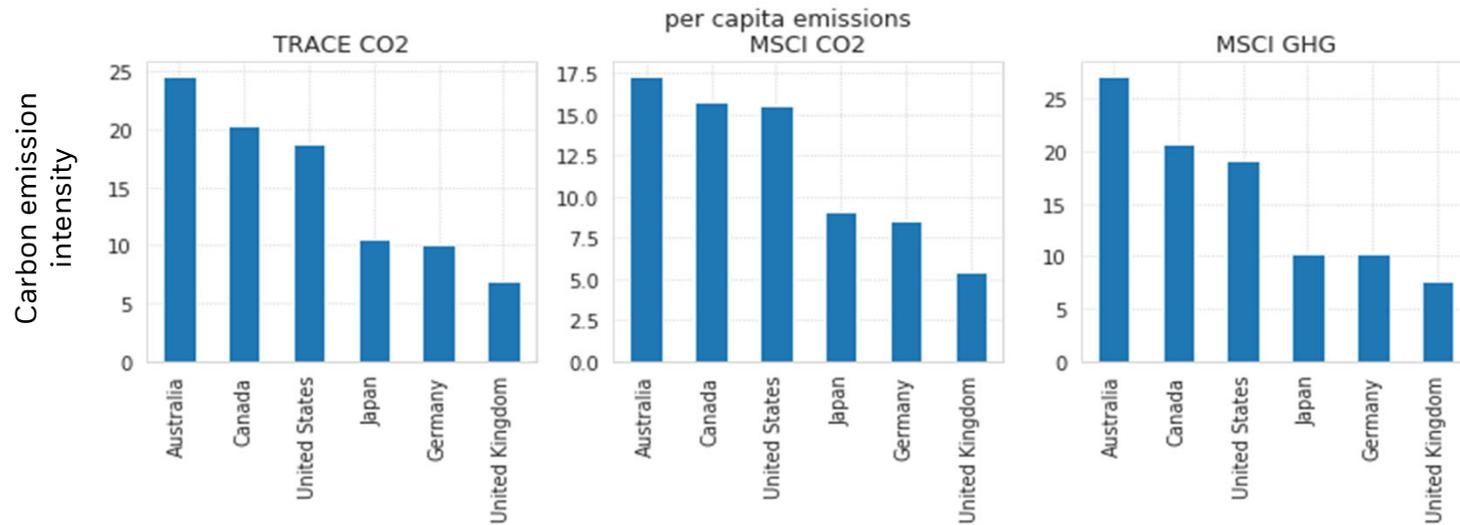
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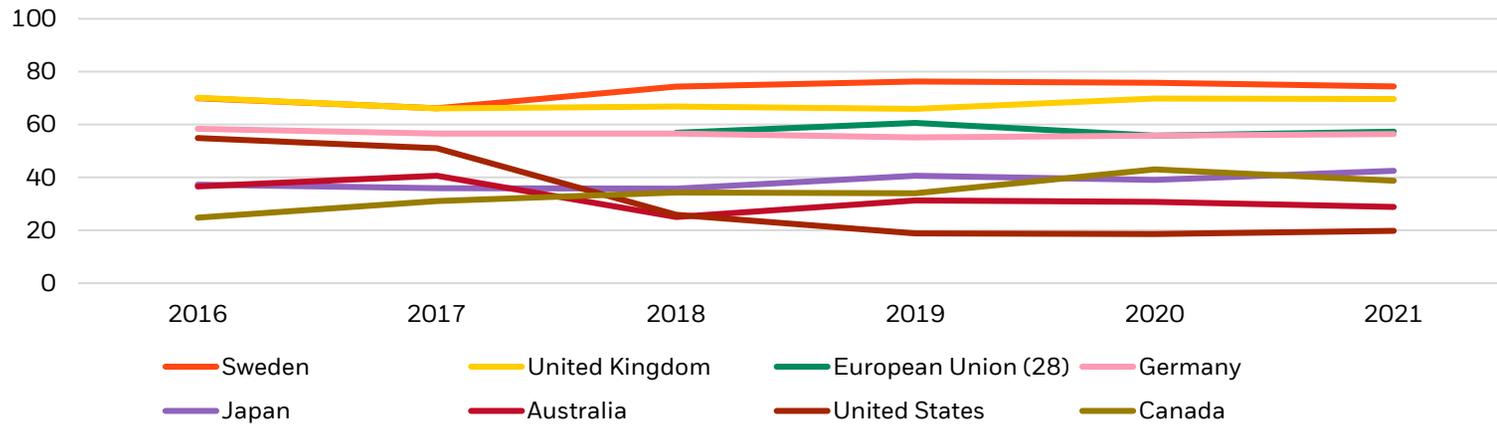
Source: Germanwatch CCPI Background and Methodology, 2021

Climate Scores of Government Bonds

Source: BlackRock, MSCI, climatetrace.org as of October 2021. Data shows the carbon emissions intensity for each country.
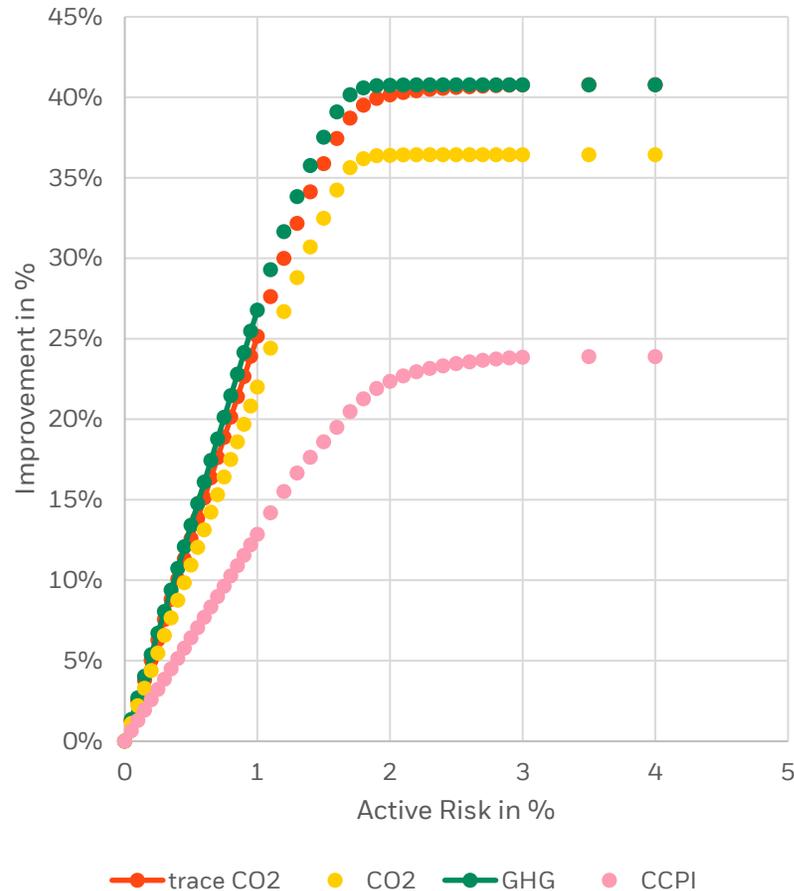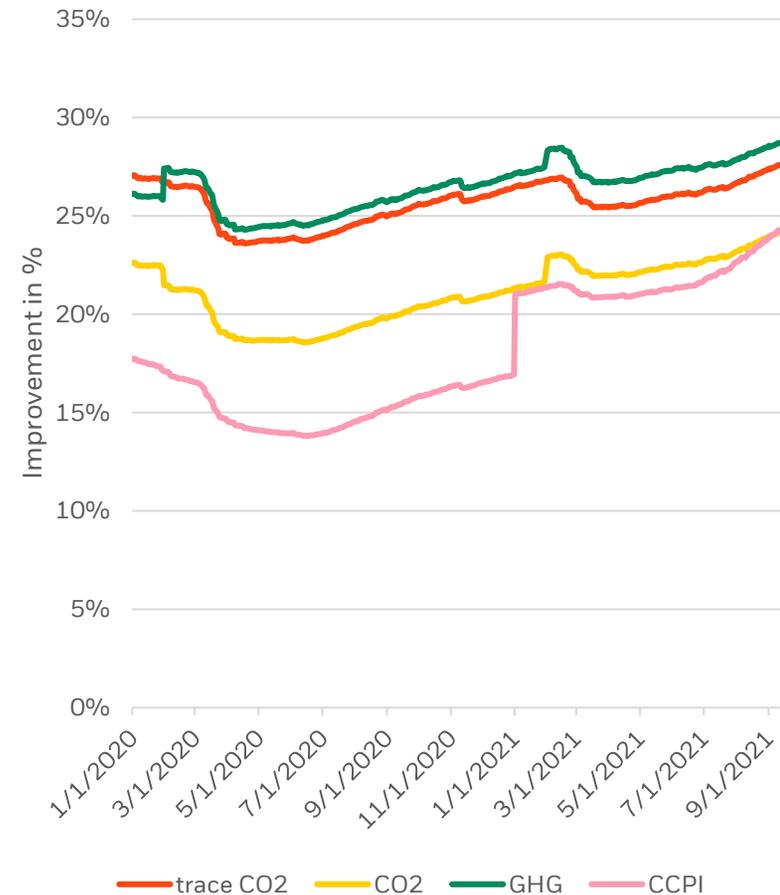

Source: BlackRock, Germanwatch as of October 2021. Data shows the CCPI score for each country over time.

Trade-off between tracking error, emissions and CCPI

Trade off between active risk and % improvement

Improvements over time with 1% active risk
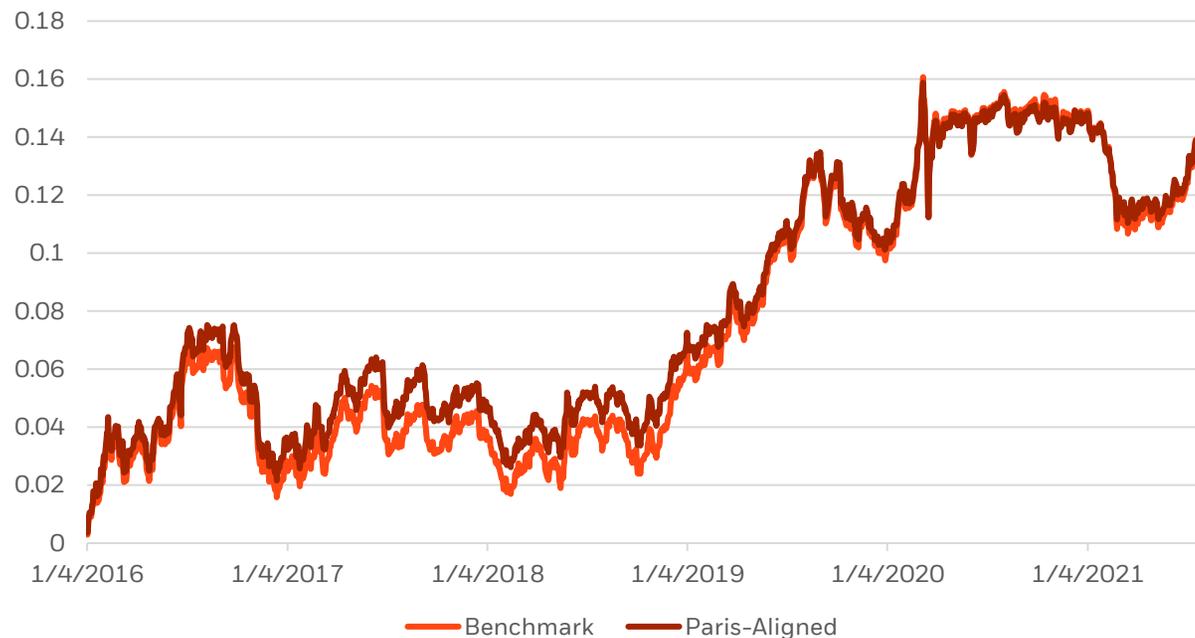
Legend: trace CO2, CO2, GHG, CCPI

Source: BlackRock, MSCI, ccpi.org and climatetrace.org as of October 2021. Simulation based on a hypothetical sovereign bond portfolio. Does not reflect that actual returns of any fund or strategy. For illustrative purposes only

Key takeaways

Sovereign portfolios play an important role in the transitions to a decarbonised world!

- Incorporating carbon emission reductions into a portfolio strategy enables more transparency

- More and better data to measure a country's emission profile are emerging

- Low tracking error portfolios can lead to lower emissions, better preparedness for the transition while retaining similar risk/return characteristics

Source: BlackRock , MSCI and Climate TRACE as of October 2021. Simulation period from Jan 2016 – Oct 2021 based on a hypothetical sovereign bond portfolio. Does not reflect that actual returns of any fund or strategy. For illustrative purposes only

Achieving net zero across the whole portfolio

Property

Target an increase in buildings with green certifications and a decrease in energy usage, while maintaining an annual decarbonization consistent with equities

Sov Bonds

Tilt into countries that exhibit lower transition and physical risk, and whose governments' National Determined Contribution targets are aligned with the Paris Agreement

Target relative and ongoing decarbonization

Incorporate government-issued green bonds

Corp Bonds

Similar to equities, follow the guidelines set out in the EU TEG Paris Aligned Benchmark to select both IG and HY names

Maintain the existing quality and value screens within the HY portfolio

Incorporate green bonds

EM Debt

Similar to DM sovereign bonds, utilize CCPI[1] data to tilt the portfolio toward higher performing issuers relative to the benchmark based on GHG Emissions, Renewable Energy, Energy Use, and Climate Policy

1. Climate Change Performance Index

Commodities

Map each commodity to its corporate supply chain and utilize company-level emissions data to estimate its emissions intensity

Assess ESG-awareness by identifying commodities whose supply chain companies are focused on ESG issues

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