The "Trucost" of Climate Investing:
Managing Climate Risks in Equity Portfolios

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Acknowledgements
The authors would like to thank Sylwia Zieba and Drew Fryer, both with Trucost for their input.

Sustainable investing[1] is a significant consideration for an ever-growing class of investors. Forty-two percent of investors surveyed in North America (Schroders Global Investor Study, 2017) cited performance as a primary concern in sustainable investing. The numbers were even higher in Asia (45%) and Europe (48%). Does sustainable investing come at a "cost", and is the fear of investors around the performance concessions of "green" portfolios warranted? Our research suggests investors' fears are misplaced – ***carbon sensitive portfolios have similar returns and significantly better climate characteristics*** than portfolios constructed without carbon emission considerations (Figure 1, Table 3, Table 4).

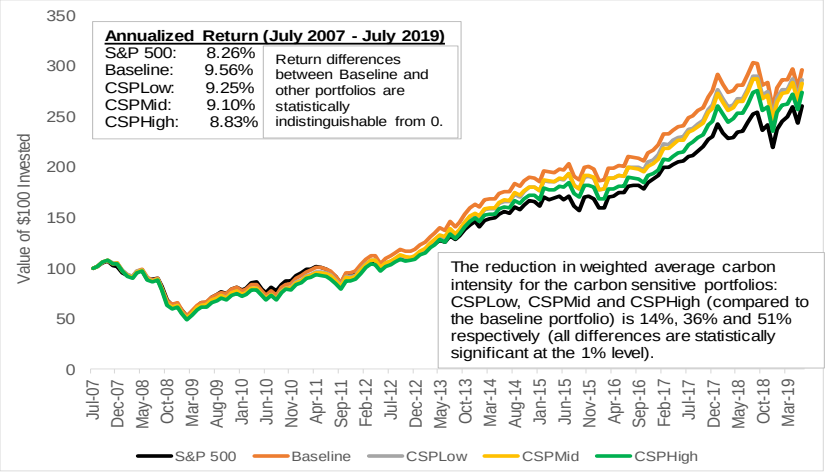
The baseline ("BasePort") and carbon sensitive portfolios (CSPLow, CSPMid and CSPHigh) are each made up of 75 stocks selected from the S&P 500 using a quantitative stock selection model. BasePort ignores a company's carbon intensity ("CI") when selecting stocks, while the carbon sensitive portfolios target increasingly stringent levels of CI (carbon intensity facilitates the comparison of greenhouse gas emissions across firms of different sizes). Our findings:

- **Highly profitable firms are likely to be leaders in reducing their carbon intensity levels** (Table 1). These firms are usually well managed, and may adopt proactive environmental strategies as a way to decrease regulatory liabilities, mitigate business risks and manage important stakeholders.

- **There is no degradation in fundamentals for the carbon sensitive portfolios compared to BasePort** (Table 3), even though the difference in constituents between the baseline and carbon sensitive portfolios can be as high as 20% (Section 3.3).

- Carbon sensitive portfolios have other desirable climate characteristics, **as we observe significant reductions in water use, air pollutants released and waste generated** compared to the baseline portfolio[2] (Table 4).

Figure 1: Value of $100 Invested in Carbon Sensitive Portfolios (July 2007 – July 2019)



Source: S&P Global Market Intelligence Quantamental Research. For all exhibits, all returns and indices are unmanaged, statistical composites and their returns do not include payment of any sales charges or fees an investor would pay to purchase the securities they represent. Such costs would lower performance. It is not possible to invest directly in an index. Past performance is not a guarantee of future results. Data as at 08/31/2019

[1] Sustainable investing considers environmental, social and governance (ESG) factors in portfolio selection and management.
[2] See definitions for water, air pollutants and waste generated in Section 3.4.

1. Greenhouse Gas Basics

The average global temperature on earth has risen by about 0.8° Celsius (1.4° Fahrenheit) since 1880, with about two-thirds of the warming occurring after 1975[3]. Scientists attribute this rise in global temperature to human–caused growth in the "greenhouse effect" — warming that results when the atmosphere traps heat radiating from earth toward space[4]. While carbon dioxide (CO_2) is most-commonly mentioned as the cause of the global rise in temperature, several gases, collectively known as greenhouse gases (GHGs), are responsible for the greenhouse effect[5].

GHG emissions are typically represented in “carbon dioxide equivalents (CO_2e)”, a term used to describe all greenhouse gases in a common unit. Each greenhouse gas has its own global warming potential (GWP), which is a measurement of how much heat the GHG can trap within the atmosphere, and how much of an environmental impact it is expected to have. Carbon dioxide equivalents puts all GHG emissions in relation to carbon dioxide, which has a GWP standardized to one[6].

The Greenhouse Gas Protocol (GHGP)[7] establishes a framework for measuring and managing GHG emissions from private and public sector operations, products and policies. GHGP covers the accounting and reporting of the six GHGs covered by the Kyoto Protocol[8]. Under the GHGP, greenhouse gas emissions are broken down into three categories:

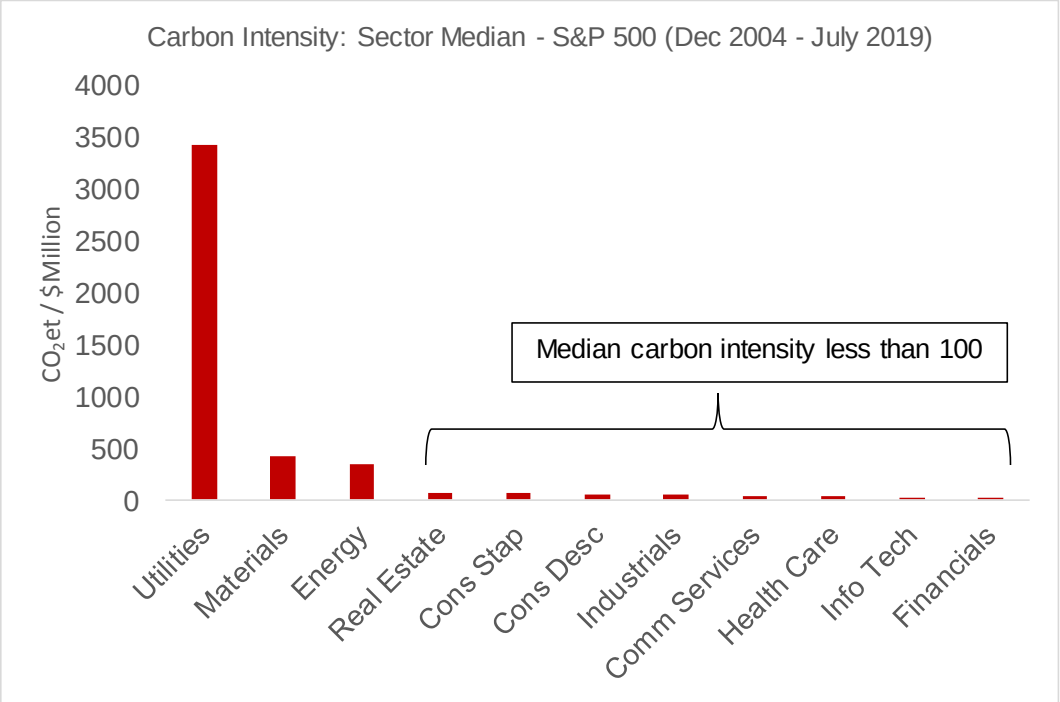
- Scope 1 (direct GHG emissions): GHG emissions from sources that are owned or controlled by a company, e.g. emissions from owned vehicles, furnaces, boilers etc.
- Scope 2 (electricity indirect emissions): GHG emissions from the generation of purchased electricity consumed by the company.
- Scope 3 (other indirect GHG emissions): GHG emissions that are a consequence of a company’s activities but occur from sources not owned or controlled by the company. This category includes emissions from a company’s supply chain and end users of the company’s products.

It is important to standardize absolute GHG emissions as larger companies tend to have higher values than smaller companies (controlling for industry differences). The norm is to scale GHG emissions by company revenue, resulting in a metric commonly referred to as “carbon intensity” (CO_2e ton per $1 million of revenue). Carbon intensity (CI) facilitates comparison of GHG emissions across companies - *entities with lower CI values generate less GHG emission per $1 million of revenue compared to entities with higher CI values*.

The climate data leveraged in this analysis comes from Trucost (see data section for description[9]). Except as otherwise stated, carbon intensity in this paper is defined as the sum of Scope 1 CO_2e and Scope 2 CO_2e divided by trailing 12-month revenue[10].

[3] National Aeronautics and Space Administration’s Goddard Institute for Space Studies.
[4] International Panel on Climate Change Fifth Assessment Report, 2014; United States Global Research Change Program
[5] See Appendix A for the six greenhouse gases identified by the Kyoto Protocol.
[6] GWP for various GHGs is available at the United Nations Climate Change website https://unfccc.int/process/transparency-and-reporting/greenhouse-gas-data/greenhouse-gas-data-unfccc/global-warming-potentials
[7] GHGP is a partnership between the World Resources Institute and the World Business Council for Sustainable Development.
[8] See Appendix A for the six greenhouse gases identified by the Kyoto Protocol.
[9] See Appendix E for carbon intensity time series coverage in the S&P 500.
[10] Scopes 1 and 2 emissions are typically disclosed by companies, while scope 3 is usually estimated through models. See Table 4 for results when we include first-tier level supply chain data in our analysis.

Figure 2: Median Sector Carbon Intensity – S&P 500 (December 2004 – July 2019)



Source: Trucost, S&P Global Market Intelligence Quantamental Research. Data as at 08/31/2019

Utilities have the highest median carbon intensity values, followed by the materials and energy sectors (Figure 2). Given the relatively high CI values of these three sectors, it is not surprising that one method investors use to lower carbon intensity is to exclude securities from one or more of these three sectors from their holdings. While this can lead to a portfolio with lower carbon intensity, it also comes with its own risk – a high portfolio tracking error[11]. The approach we take in this report reduces a portfolio’s carbon intensity, while keeping the portfolio’s tracking error within established limits.

2. Is Climate Data Related to Profitability?

Several academic studies document that companies with lower carbon emissions have higher profitability levels than companies with higher emission activity[12]. Highly profitable firms are usually well managed, and have the resources to adopt proactive environmental strategies as a way to decrease regulatory liabilities, mitigate business risks and manage important stakeholders. In addition, optimizing energy use (reduces operating expenses and improves profitability) either through the use of new energy efficient equipment or adopting energy conservation policies, has the added benefit of reducing pollution as carbon emissions are correlated to energy consumption.

We sort stocks (GICS 4-digit industry group neutral sort) in the S&P 500 universe on carbon intensity into quintiles, with stocks with the lowest (highest) values in quintile 1(5). This approach should mitigate sector or industry influences in our analysis. Our test runs from December 2004 to July 2019[13].

[11] Tracking error is a measure of the divergence between the performance of a portfolio and a benchmark.
[12] Delmas and Nairn-Birch (2011); In, Park and Monk (2017).
[13] Carbon intensity data was lagged by 18 months for this analysis.

We observe statistically significant median differences between quintile 1 and quintile 5 for both profitability metrics (gross profit to assets and return on equity)[14], suggesting that companies with the lowest GHG emission per $1 million of revenue are on average more profitable than those with the highest GHG emission per $1 million of revenue. The difference in profitability values between quintiles 1 and 5 is unlikely driven by size, as the market capitalization difference between both quintiles is not significant at the 10% level.

Table 1: Median Fundamental Characteristics
Low vs High CI Quintiles: S&P 500 (December 2004 – July 2019)

Characteristic	Low Carbon Intensity Quintile 1	High Carbon Intensity Quintile 5	Difference Low - High
Market Cap $'M	13,030	14,095	-1,065
Gross Profit-to-Asset (GPA)	27.84%	22.63%	5.21%***
Return on Equity (ROE)	14.71%	13.27%	1.44%***

*** statistically significant at 1% level; ** statistically significant at 5% level; * statistically significant at 10% level.
Source: S&P Global Market Intelligence Quantamental Research. Data as at 08/31//2019.

3. Constructing Carbon Sensitive Equity Portfolios

An exclusionary portfolio construction approach can lead to portfolios with higher tracking errors than desired. For example, as of October 31, 2019, excluding the 3 sectors with the highest median carbon intensity (utilities, energy and materials) would imply excluding about 11% by market capitalization of both the S&P 500 and the Russell 2000 small cap universe. A portfolio optimization approach sidesteps the tracking error issue by pushing stock selection towards securities with lower carbon intensity values, while at the same time adhering to targets outlined in a portfolio manager’s investment framework (tracking error, liquidity, turnover etc.).

3.1. Portfolio Optimization Framework

The goal is to construct carbon sensitive portfolios – portfolios with lower carbon intensity, but similar return/fundamental characteristics as a baseline portfolio (BasePort). The baseline portfolio is a portfolio of 75 stocks selected from the S&P 500 using a stock selection strategy, while adhering to several real world investment constraints. BasePort ***does not*** take into account the carbon intensity of companies when selecting stocks, as securities are chosen solely based on their projected alpha and desired portfolio constraints.

The carbon sensitive portfolios are constructed using the same alpha model and constraints as BasePort, *but in addition, taking into account a company’s carbon intensity*. We create three carbon sensitive portfolios (CSPLow, CSPMid and CSPHigh), with each portfolio targeting increasingly stringent levels of carbon intensity.

The portfolio constraints and tools used to create the baseline and carbon sensitive portfolios are listed below[15]. The starting universe for all portfolios is the S&P 500.

[14] GPA = trailing twelve month gross profit divided by total assets; ROE = trailing twelve month net income divided by equity.
[15] A comprehensive list is provided in Appendix B.

- S&P Global Market Intelligence Growth Benchmark Model (GBM) to select candidate stocks for baseline and carbon sensitive portfolios.
- Maximum annualized tracking error of 4%.
- Annual portfolio turnover of 100% with transaction cost of 20bps per trade (one-way).
- Maximum active stock weight and sector exposure of 2% and 3% respectively.
- Beta and market cap neutral to the S&P 500.

Given that climate data is collected over a cycle which extends well beyond a company’s mandated filing date, we lag all climate data used in this research by 18 months. This is a conservative lag and should prevent any look-ahead bias in our results.

3.2. Baseline Portfolio vs S&P 500

Although BasePort generated a higher annualized return (9.56% vs 8.26%) than the S&P 500, the difference is statistically indistinguishable from 0 (Table 2). In addition, the weighted average carbon intensity[16] of BasePort is 15% below that of the S&P 500 (188 vs 222).

Table 2: Return, Fundamental and Carbon Intensity Characteristics: Baseline Portfolio vs S&P 500 (July 2007 – July 2019)

	Annualized Return	Sharpe Ratio	Weighted Average Carbon Intensity (CO_2 t / $1M Revenue)	Weighted Average Market Capitalization ('$M)	Weighted Average Gross Profit-to-Asset (GPA)	Weighted Average Earnings Yield (EY)	Weighted Average Book Yield (BY)	Weighted Average 1-Year Sales Per Share Growth (SalesG)
Baseline Portfolio (A)	9.56%	0.41	188	125,477	33.45%	6.49%	36.96%	12.33%
S&P 500 (B)	8.26%	0.42	222	132,879	30.28%	5.64%	40.17%	8.43%
Difference (A - B)	1.30%	-0.01	-34***	-7,402	3.17%***	0.85%***	-3.21%***	3.90%***

*** Statistically significant at 1% level; ** statistically significant at 5% level; * statistically significant at 10% level.
Source: S&P Global Market Intelligence Quantamental Research. For all exhibits, all returns and indices are unmanaged, statistical composites and their returns do not include payment of any sales charges or fees an investor would pay to purchase the securities they represent. Such costs would lower performance. It is not possible to invest directly in an index. Past performance is not a guarantee of future results. Data as at 08/31//2019.

3.3. Baseline Portfolio vs Carbon Sensitive Portfolios

To understand the potential impact of decarbonization on the return and fundamentals of BasePort, we create three new portfolios with various carbon intensity reduction targets - CSPLow, CSPMid and CSPHigh. The CSPLow (CSPHigh) portfolio has the lowest (highest) carbon intensity reduction target.

We restate the values for the baseline portfolio in the first row of Table 3 (first panel). Each of the last four panels contain the absolute values for the carbon sensitive portfolios/S&P 500 and the difference between these portfolios and BasePort. For example, the weighted average carbon intensity of CSPLow (161 CO_2e t /$Million) is 27 units smaller than that of BasePort (188 CO_2e t /$Million), and the difference is statistically significant at the 1% level. A few observations from the table:

- **Incorporating carbon intensity in a stock selection process *does not detract* from portfolio performance**. All three carbon sensitive portfolios produce comparable returns to the baseline portfolio with all the differences (range from 0.31% to 0.73% annualized) all statistically indistinguishable from 0.

[16] Weighted average of a characteristic is calculated by taking the weighted sum of the characteristic for all the stocks in a portfolio or the S&P 500. Weights are determined by portfolio weight (baseline/carbon sensitive) or market capitalization (S&P 500).

- **All three carbon sensitive portfolios have slightly higher Sharpe ratios (compared to BasePort)**, perhaps a reflection of the fact that these portfolios underweight sectors (energy and materials) with high median carbon intensity levels and elevated return volatility (see Appendix C for average active sector weights).
- The reduction in weighted average carbon intensity (CSPLow: 14%, CSPMid: 36% and CSPHigh 51%) **was achieved *without a degradation in portfolio fundamentals*** (compared to BasePort). These reductions in CI would even be larger if the comparison was made to the S&P 500. For example the reduction in carbon intensity would be 59% for the CSPHigh portfolio, if it was compared to the S&P 500.

Table 3[17]: Return, Fundamental and Carbon Intensity Characteristics: Baseline Portfolio vs Carbon Sensitive Portfolios (S&P 500: July 2007 – July 2019)

	Annualized Return	Sharpe Ratio	Weighted Average Carbon Intensity (CO_2e t / $1M Revenue)	Weighted Average Market Capitalization ('$M)	Weighted Average Gross Profit-to-Asset	Weighted Average Earnings Yield	Weighted Average Book Yield	Weighted Average 1-Year Sales Per Share Growth
Baseline ("A")	9.56%	0.41	188	125,477	33.45%	6.49%	36.96%	12.33%
CSPLow ("B")	9.25%	0.46	161	124,673	33.19%	6.51%	37.14%	12.40%
B - A	-0.31%	0.05	-27***	-804	-0.26%	0.02%	0.18%	0.07%
CSPMid ("C")	9.10%	0.46	121	125,463	33.55%	6.52%	37.24%	12.36%
C - A	-0.46%	0.05	-67***	-14	0.10%	0.03%	0.28%	0.03%
CSPHigh ("D")	8.83%	0.44	92	126,042	33.71%	6.42%	35.44%	12.56%
D - A	-0.73%	0.03	-96***	565	0.26%	-0.07%	-1.52%	0.23%
S&P 500 ("E")	8.26%	0.42	222	132,879	30.28%	5.64%	40.17%	8.43%
E - A	-1.30%	0.01	34***	7,402	-3.17%***	-0.85%***	3.21%***	-3.90%***

*** Statistically significant at 1% level; ** statistically significant at 5% level; * statistically significant at 10% level.

Source: S&P Global Market Intelligence Quantamental Research. For all exhibits, all returns and indices are unmanaged, statistical composites and their returns do not include payment of any sales charges or fees an investor would pay to purchase the securities they represent. Such costs would lower performance. It is not possible to invest directly in an index. Past performance is not a guarantee of future results. Data as at 08/31//2019. See Appendix F for standard errors of monthly return differences.

The maximum drawdown for all portfolios range from 55% (BasePort and S&P 500) to 59% (CSPHigh). CSPHigh also has the highest realized tracking error (3.20%), which should not be surprising as it has the largest active sector weights relative to the S&P 500 (Appendix C). We provide additional portfolio details in Appendix D.

Was the reduction in carbon intensity achieved by only re-weighting stocks in the baseline portfolio? The answer is no. The holdings overlap percentage (# of stocks common to BasePort and a carbon sensitive portfolio divided by the average # of stocks in both portfolios) is 81%, 85% and 88% for CSPHigh, CSPMid and CSPLow respectively. This indicates that the constituents of the carbon sensitive portfolios are different from that of BasePort.

3.4. Other Portfolio Climate Characteristics

While a reduction in GHG is usually a main focus, a company’s activity in other areas (such as air pollution, excessive water use and volume of waste generated) can have a negative long term impact on the environment. Trucost collects other data points that provide a comprehensive view of a company’s total environmental activity. Do the three carbon sensitive portfolios have better climate characteristics than BasePort? Table 4 provides answers (description of the column headers are presented below):

[17] Although not shown here, our results are qualitatively similar when we used 100 stock portfolios and/or a different risk model.

- Col1: [GHG Direct emissions[18] + company’s first level supply chain GHG emissions] divided by revenue. This metric helps to identify a company whose first level supply chain is generating significant GHG emissions.
- Col2: Total water generated internally and purchased externally (measured in cubic meters) divided by revenue. A metric for a company’s water usage.
- Col3: Dollar estimate of the “lifetime damage” of air pollutants generated by a company divided by revenue. Damage costs are based on models that estimate the impact of pollutants on human health (air quality), agricultural productivity etc.
- Col4: Quantity of waste incinerated by a company (in tons) divided by revenue.

Table 4: Climate Characteristics: Baseline Portfolio vs Carbon Sensitive Portfolios (S&P 500: July 2007 – July 2019)

	Weighted Average Intensity: GHG Direct & First Tier Indirect (CO_2e t / $M Revenue) "Col1"	Weighted Average Intensity: Water Direct & Purchased (Cubic meters / $M Revenue) "Col2"	Weighted Average Impact Ratio: Air Pollutants (%) "Col3"	Weighted Average Intensity: Waste Incineration (tonnes / $M Revenue) "Col4"
Baseline ("A")	245	28,110	0.17%	0.33
CSPLow ("B)	212	24,040	0.14%	0.32
(B - A) / A	-13%***	-14%**	-18%***	-3%
CSPMid ("C")	168	20,382	0.10%	0.31
(C - A) / A	-31%***	-27%***	-41%***	-6%
CSPHigh ("D")	135	12,280	0.08%	0.29
(D - A) / A	-45%***	-56%***	-53%***	-12%**
S&P 500 ("E")	288	21,622	0.22%	0.36
(E - A) / A	+18%***	-23%***	+29%***	+9%*

*** Statistically significant at 1% level; ** statistically significant at 5% level; * statistically significant at 10% level.
Source: S&P Global Market Intelligence Quantamental Research. Data as at 08/31//2019.

The values of the baseline portfolio are in the first panel. Each of the last four panels contain the absolute values for the carbon sensitive portfolios/S&P 500 and the percentage difference between these portfolios and BasePort.

Controlling for carbon intensity has the added benefit of improving the overall climate characteristics of portfolios. The largest benefits accrue to CSPHigh, but we see improved climate characteristics for CSPLow and CSPMid. For example, we see a reduction of 45% (“Col1”) when supply chain activity is included in GHG emissions (CSPHigh vs BasePort). Similarly, the CSPHigh portfolio’s weighted average water intensity is 56% (Col2) lower than that of BasePort.

Waste intensity was the only climate metric in which we did not see significant improvements for both CSPLow and CSPMid. One suggestion to improve the overall climate characteristics of a portfolio would be to use all available climate data in the stock selection process, rather than just carbon intensity as we have demonstrated in this research.

[18] Direct GHG emissions is scope1 GHG emissions plus scope 1 GHG emissions from the combustion of biomass.

4. Data

Climate Data

Trucost, part of S&P Global, provides robust and standardized environmental data on more than 15,000 listed companies. Trucost’s data and analysis provides insights relating to climate change, water use, waste disposal, fossil fuel exposure, land, water & air pollution, and the over-exploitation of natural resources. Trucost also specializes in forward-looking datasets on transition risk such as future carbon pricing scenarios and physical risk that can have significant financial implications.

Risk & Stock Selection Models

The risk model used for this analysis is the **S&P Global Market Intelligence U.S Fundamental risk model**, one of six time series country/region/global equity risk models available to clients. All risk models were built using Point-In-Time (PIT) data sources[19], and use style factors to better reflect the key building blocks typically used in alpha generation and portfolio construction. Apart from the U.S and a global risk model, other country/region risk models available include: Canada, China A-share, Pan-Asia ex Japan and Pan-Europe.

The **U.S Growth Benchmark Model** (GBM”) is one of eight country/regional stock selection models offered by S&P Global Market Intelligence. GBM identifies companies with a consistent track record of earnings growth, as well as emerging growth candidates. The model scores are based on seven subcomponents: Earnings Momentum, Historical Growth, Liquidity & Leverage, Price Momentum, Value, Quality, and Capital Efficiency.

Fundamental Data

S&P Capital IQ Premium Financials and Compustat® North America packages were the sources of fundamental data for this study and both are PIT.

5. Conclusion

In this report, we demonstrate that carbon sensitive portfolios provide similar performance characteristics to a portfolio (BasePort) that does not take into account the carbon intensity of companies when selecting stocks. All three carbon sensitive portfolios have significantly lower weighted average carbon intensity than the baseline portfolio, with the reductions ranging from 14% (CSPLow) to 51% (CSPHigh).

Carbon sensitive portfolios contain other desirable climate characteristics, as we observe significant reductions in water use, air pollutants released and waste generated compared to the baseline portfolio. Overall, carbon sensitive portfolios have better climate characteristics than BasePort.

Finally, highly profitable firms are likely to be leaders in reducing their carbon intensity levels. These firms are often well managed, and may adopt proactive environmental strategies as a way to decrease regulatory liabilities, mitigate business risks and manage important stakeholders.

[19] A point-in-time database eliminates look-ahead bias in back-tests

APPENDIX A: List of Greenhouse Gases – Kyoto Protocol

Carbon Dioxide
Methane
Nitrous Oxide
Hydrofluorocarbons
Perfluorocarbons
Sulfur hexafluoride

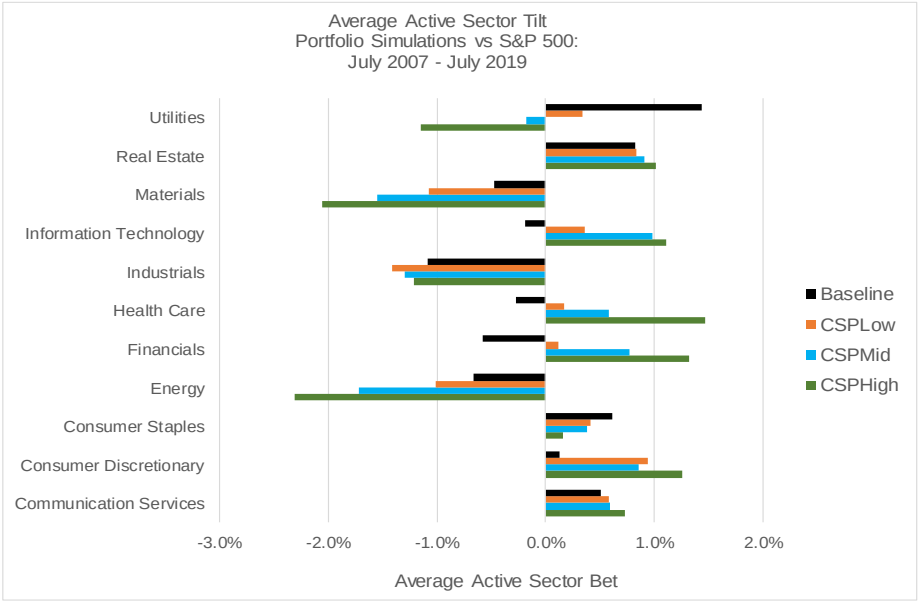
Source: United Nations Climate Change, 2019.
https://unfccc.int/process-and-meetings/the-kyoto-protocol/what-is-the-kyoto-protocol/kyoto-protocol-targets-for-the-first-commitment-period

APPENDIX B: Complete List of Portfolio Constraints and Tools used to Create Baseline and Carbon Sensitive Portfolios

- S&P Global Market Intelligence Growth Benchmark Model (GBM) to select candidate stocks for baseline and carbon sensitive portfolios.
- Maximum annualized tracking error of 4% using S&P Global Market Intelligence U.S Risk Model
- Annual portfolio turnover 100% with transaction cost of 20bps per trade (one-way).
- Maximum active stock weight and sector exposure of 2% and 3% respectively.
- Beta and market cap neutral to the S&P 500.
- Maximum Trade Size: 10% of average daily volume
- Initial portfolio value: $1 billion
- Maximum cash holdings: 5%
- ClariFI for portfolio optimization: ClariFI is an advanced research and portfolio management tool.

Source: S&P Global Market Intelligence Quantamental Research. Data as at 08/31//2019

APPENDIX C: Average Sector Tilt of all Portfolios to the S&P 500 (July 2007 – July 2019)



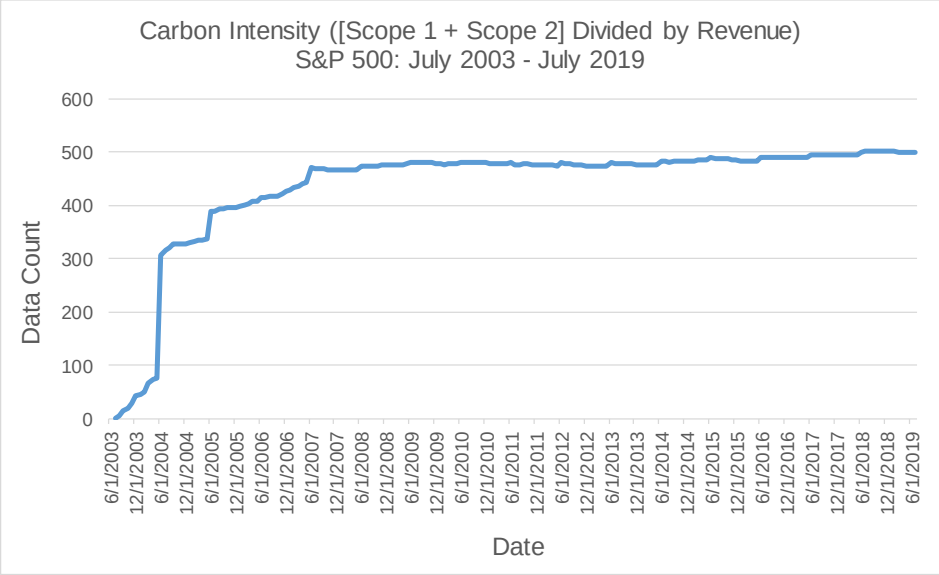
Source: S&P Global Market Intelligence Quantamental Research. Data as at 08/31//2019

APPENDIX D: Portfolio Simulation Characteristics (S&P 500: July 2007 – July 2019)

Characteristic	Baseline	CSPLow	CSPMid	CSPHigh	S&P 500
Realized Tracking Error	3.11%	3.13%	3.15%	3.20%	
Realized Turnover (one-way)	99.50%	99.50%	99.50%	99.50%	
Maximum Drawdown	54.98%	57.30%	57.63%	58.88%	55.25%

Source: S&P Global Market Intelligence Quantamental Research. For all exhibits, all returns and indices are unmanaged, statistical composites and their returns do not include payment of any sales charges or fees an investor would pay to purchase the securities they represent. Such costs would lower performance. It is not possible to invest directly in an index. Past performance is not a guarantee of future results. Data as at 08/31//2019

APPENDIX E: Time Series Coverage of Carbon Intensity for S&P 500



Source: S&P Global Market Intelligence Quantamental Research.Data as at 08/31//2019

APPENDIX F: Average Monthly Return Difference Between BasePort and Carbon Sensitive Portfolios with Associated Standard Errors

The first row is the average monthly difference in returns between BasePort and another portfolio. The second row is the standard error of the return differences.

	CSPLow	CSPMid	CSPHigh	S&P 500
Return Difference	0.02%	0.03%	0.05%	0.10%
Standard Error	0.03%	0.04%	0.04%	0.07%

Source: S&P Global Market Intelligence Quantamental Research.Data as at 08/31//2019

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- Have produced superior stock price performance, compared to the market average.
- Have a demonstrated culture of Diversity and Inclusion, evinced by more females on the company’s board of directors.

June 2019: Looking Beyond Dividend Yield: Finding Value in Cash Distribution Strategies

Examines the relationship between yield-oriented strategies (dividend yield, buyback yield, and combined shareholder yield) and future stock return, across multiple countries/regions. Also provides insights into two additional topics:

- Which company fundamental characteristics support and enhance future shareholder payouts?
- Under which interest rate environment should investors favor yield-oriented strategies?

June 2019: The Dating Game: Decrypting the Signals in Earnings Report Dates

The first part of this report focuses on companies that deviate from a historical reporting pattern, while the second part examines a related topic – the market’s reaction to companies that postpone a previously scheduled (announced) earnings release date.

- “Advancers” (companies that advance their earnings report date by at least 6 days) are likely to report improving year-year on sales, better earnings surprises, and more positive conference call sentiment readings than their industry group peers and “delayers” (companies that delay their earnings report date by at least 6 days).
- Advancers outperform delayers by over 7% on an annualized basis (Russell 3000). This return rises to 8.80% (Russell 2000) and falls to 2.21% (Russell 1000).
- The annualized return to stocks identified as buy candidates and tagged as advancers is 10.77%, compared to 6.29% for buy candidates tagged as delayers.
- Companies that postpone a previously announced earnings release date underperform the broad market by 2.44% in the 3 days surrounding the announcement. These companies are also likely to report deteriorating fundamentals.

May 2019: Bridges for Sale: Finding Value in Sell-Side Estimates, Recommendations, and Target Prices

This report looks at the informativeness of analyst recommendation revisions, target price revisions, and estimate dispersion, primarily within the post-2002 regulatory environment, and finds significant results in all three areas:

- Investors should focus on shifts in consensus recommendations, as the recommendation level by itself often reflects pro-management and high-growth biases.

- Target prices, labeled by some practitioners as “fiction” likewise provide insight into changing analyst attitudes. The six-month change in target price gap (the spread between target and market price) produces statistically significant results globally.
- Analyst estimate dispersion acts as an indicator of corporate quality – high quality companies have more stable revenue and income streams that are more amenable to forecasting

February 2019: U.S Stock Selection Model Performance Review

U.S. stock returns faced headwinds due to the uncertainty around monetary and fiscal policies in 2018. At this time last year, we reported 15 months of consecutive positive returns for the S&P 500 (Dec 2016 to Jan 2017) which tied the previous 1959 record for longest winning streak for the index. Shortly thereafter, we saw the streak break when February yielded a return of -3.69%. Four of twelve months (Feb, Mar, Oct, and Dec) in 2018 saw S&P 500 declines, which pushed cumulative index returns down 7.18% on the year. The primary manifestation of this uncertainty was geopolitical events including the mid-term elections, trade tariffs, and a government shutdown that stretched into 2019 to become the longest shutdown in history.

February 2019: International Small Cap Investing: Unlocking Alpha Opportunities in an Underutilized Asset Class

Institutional investors typically overlook or underweight small cap equities in global mandates for a number of reasons, including a higher risk level (relative to large caps), a lack of operational history, liquidity, and information/data gaps which make it challenging to make informed investment decisions. However, investors who are willing to embrace the risk in small cap investing also stand to reap the benefits of allocating to this asset class – potentially earning higher risk-adjusted performance and portfolio diversification. In this report, we examine international small cap performance across various themes and provide actionable insights for both fundamental and quantitative investors, by identifying key drivers of small cap stock performance.

January 2019: Value and Momentum: Everywhere, But Not All the Time

“Momentum” and “Value” strategies have had well-documented return premia in multiple geographies and asset classes. Average monthly returns to momentum are larger than average returns to value, caveated by large pullbacks (“crashes”) in the momentum portfolio. Practitioners often include both approaches in their investment strategy.

- Dynamically weighting value and momentum strategies by a function of the trailing volatility in the momentum portfolio produces a superior information ratio (IR), total return, and lower maximum drawdown compared to a naïve equal weighting.
- Results are consistent in six regions (U.S., Europe, Asia Ex-Japan, Japan, Latin America, and Emerging Markets) and in multiple robustness checks. We maintain dollar neutrality and persistent leverage of 1.0 in all specifications.
- Monte Carlo simulation supports the conclusion that the shift of tail density from left- to right-tail drives the performance improvements. That is, large drawdowns are avoided.

November 2018: Forging Stronger Links: Using Supply Chain Data in the Investing Process

September 2018: Their Sentiment Exactly: Sentiment Signal Diversity Creates Alpha Opportunity

September 2018: Natural Language Processing – Part II: Stock Selection: Alpha Unscripted: The Message within the Message in Earnings Calls

July 2018: A Case of ‘Wag the Dog’? - ETFs and Stock-Level Liquidity

June 2018: The (Gross Profitability) Trend is Your Friend

May 2018: Buying the Dip: Did Your Portfolio Holding Go on Sale?

March 2018: In the Money: What Really Motivates Executive Performance?

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January 2018: U.S Stock Selection Model Performance Review

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June 2017: Research Brief: Four Important Things to Know About Banks in a Rising Rate Environment

April 2017: Banking on Alpha: Uncovering Investing Signals Using SNL Bank Data

March 2017: Capital Market Implications of Spinoffs

January 2017: U.S. Stock Selection Model Performance Review 2016

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September 2016: A League of their Own: Batting for Returns in the REIT Industry - Part 1

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November 2015: Late to File - The Costs of Delayed 10-Q and 10-K Company Filings

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September 2015: Equity Market Pulse – Quarterly Equity Market Insights Issue 5

September 2015: Research Brief: Building Smart Beta Portfolios

September 2015: Research Brief – Airline Industry Factors

August 2015: Point-In-Time vs. Lagged Fundamentals – This time i(t')s different?

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July 2015: Research Brief – Liquidity Fragility

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April 2015: Drilling for Alpha in the Oil and Gas Industry – Insights from Industry Specific Data & Company Financials

March 2015: Equity Market Pulse – Quarterly Equity Market Insights Issue 3

February 2015: U.S. Stock Selection Model Performance Review - The most effective investment strategies in 2014

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October 2014: Lenders Lead, Owners Follow - The Relationship between Credit Indicators and Equity Returns

August 2014: Equity Market Pulse – Quarterly Equity Market Insights Issue 1

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February 2011: Industry Insights – Biotechnology: FDA Approval Catalyst Strategy

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January 2011: Interesting and Influential Papers We Read in 2010

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