Doing The Right Thing Does Not Have to Come at a (Carbon) Cost

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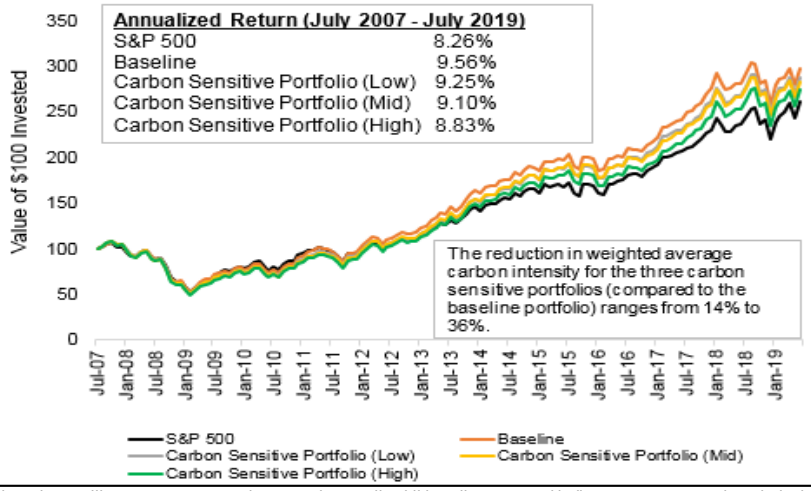
The value of global assets with an environmental, social, or governance (ESG) focus topped $1 trillion in the first half of 2020[1], as the largest institutional investors and companies pledged to tackle climate change and address social issues.[2] Despite this growth in ESG assets, incorporating ESG factors in equity portfolios is perceived to lead to lower returns. Almost half of institutional investors polled in a 2019 investor survey cited the performance of sustainable strategies as an area of concern.[3] 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)*.*

In this research, we created a "baseline" portfolio and three carbon sensitive portfolios. **The baseline portfolio (described in Appendix B) 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).[4]

The conclusion from Figure 1 is that 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 return differences statistically indistinguishable from zero. Carbon sensitive portfolios are typically comprised of highly profitable companies (Table 1), as optimizing energy use through the use of new energy efficient equipment, or adopting energy conservation policies can lower operating expenses.

Figure 1: Value of $100 Invested in Climate 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] Financial Times, August 9, 2020, "ESG Funds Attract Record Inflows During Crisis".
[2] Financial Times, October 16, 2019 "Global Business Chiefs Pledge to Boost Sustainable Development"
[3] Schroders Global Investor Study, 2019
[4] Companies with low carbon intensity emit less carbon per $million in revenue compared to companies with high scores. See Appendix A for introduction to greenhouse gases (GHGs). Each portfolio is comprised of 75 stocks.

1. Climate Data and Profitability

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. Furthermore, energy optimization can reduce operating expenses since carbon emissions are correlated to energy consumption. Therefore, there is likely a positive relationship between carbon efficiency and profitability.

We sort stocks (grouped by industry) in the S&P 500 universe on carbon intensity into quintiles, with stocks with the lowest values in quintile 1 and those with the highest values in quintile 5.[5] This approach should mitigate sector or industry influences in our analysis. Stocks with the smallest carbon intensity values have better profitability metrics than stocks with the largest values as evidenced by the last column in Table 1.[6]

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.

Finally, while a reduction in greenhouse gases is usually the main focus, a company's activity in other areas (such as excessive water use and volume of waste generated) can have a negative long term impact on the environment. Carbon sensitive portfolios have significantly better climate characteristics than the baseline portfolio and the S&P 500. For example, companies in carbon sensitive portfolio (high) use 56% and 43% less water than companies in the baseline portfolio and S&P 500 respectively (Appendix C).

2. 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.

[5] Quintile 1 is comprised of 20% of the S&P 500 universe with the lowest carbon intensity values, while quintile 5 is comprised of 20% of the S&P 500 universe with the highest values.
[6] GPA = trailing twelve month gross profit divided by total assets; ROE = trailing twelve month net income divided by equity.

APPENDIX A: 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[7]. 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[8]. 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.

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[9].

The Greenhouse Gas Protocol (GHGP) [10] 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. 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. 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[11].

[7] National Aeronautics and Space Administration's Goddard Institute for Space Studies.
[8] International Panel on Climate Change Fifth Assessment Report, 2014; United States Global Research Change Program
[9] 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
[10] GHGP is a partnership between the World Resources Institute and the World Business Council for Sustainable Development.
[11] Scopes 1 and 2 emissions are typically disclosed by companies, while scope 3 is usually estimated through models.

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

- S&P Global Market Intelligence Growth Benchmark Model (GBM) to select candidate stocks for baseline and carbon efficient 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: Climate Characteristics of Portfolios

- Col1: [GHG Direct emissions[12] + company's first level supply chain GHG emissions] divided by revenue.
- 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.

Climate Characteristics: Baseline Portfolio vs Carbon Efficient 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. CSPLOW, CSPMid and CSPHigh represent carbon sensitive portfolio (Low), carbon sensitive portfolio (Mid) and carbon sensitive portfolio (High) respectively.**

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

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Our Recent Research

July 2020: The Analyst Matrix: Profiting from Sell-Side Analyst's Coverage Networks

This report uses sell-side analysts' coverage data to build a connected-firm network (CFN) - a portfolio of companies that are covered by analyst(s) that follow a focal firm. This network has three broad applications: measuring the "strength" of economic relationships between companies; forecasting fundamentals of companies in the network; and as a stock selection signal. Key insights include:

- Connected-firm networks quantify the strength of relationships between companies in the network (Figure 1), unlike sector relationships which are binary
- The alpha signal constructed from the network is effective across most developed markets, with long-short returns ranging from 4.08% (Europe ex-UK) to 7.78% (US). Performance is also stronger within a universe of firms with the most complex networks (9.69%), vs. 6.02% for a universe of stocks with simple networks
- Models used to forecast EPS estimate revisions can be improved by incorporating the prior month's estimate revisions for all the stocks in the company's connected-firm network

June 2020: The Information Supply Chain Begins Recovering From COVID

The COVID-19 shockwaves emanating through the global supply chain continue to reverberate. The information that decision makers have traditionally relied have also been disrupted but is slowly showing signs of normalizing. S&P Global Market Intelligence processes 64,000 financial documents each day, placing it in a central position in the information supply chain with a unique view into the specific areas and magnitude of information disruption.

May 2020: Never Waste a Crisis: Following the Smart Money Through Beneficial Ownership Filings

Investors looking for ideas amid the recent market downturn may profit from reviewing beneficial ownership filings: SEC schedules 13D and 13G. These purchases often represent high conviction buys by activists, industry insiders, hedge funds, etc. Our previous investor activism research shows that investors can benefit by following activists' lead: a portfolio of stocks that activists had targeted outperformed the market by over 8% annually.

This report examines recent 13D and 13G filings, and spotlights four purchases of target companies with high historical operating cash flows and below average dividend payments, characteristics of companies typically targeted by activists.

May 2020: Risky Business: Foot Traffic, Vacancy Rates and Credit Risks

The COVID-19 pandemic has led to widespread closures of retail stores, offices and hotels. Foot traffic data can be combined with traditional financial ratios to provide a more holistic view of business health for both credit and equity investors. This report extends our prior

analysis of foot-traffic data by setting foot traffic figures in the context of a screen for identifying where risks may be highest.

The analysis in this report can help: i) Creditors identify customers that require additional credit facilities to support growth, or companies where existing credit lines need to be reassessed given bleak prospects; and ii) Equity investors identify companies where revenues may be accelerating or firms that may have difficulty meeting financial obligations.

May 2020: Finding the Healthy Stocks in Health Care During Lockdown

Elective and non-essential medical procedures are on an indefinite hold in many places. Simultaneously, essential medical services are in high demand, and likely to remain in demand for the near future. This dynamic creates winners and losers among Health Care device manufacturers and distributors. Investors can identify potential opportunities in the Health Care Equipment and Services subsector by analyzing 510(k) premarket notifications, which are filings required by the U.S. Food and Drug Administration (FDA) for any company seeking to market a medical device in the United States.

May 2020: No More Walks in the (Office) Park: Tying Foot Traffic Data to REITs

Foot traffic data provides investors and corporate managers with key insights on the level of activity at properties and the demographic profile of visitors to these locations. Corporate managers can use this information to pinpoint properties at greater risk of tenant defaults, while investors can use foot traffic data to identify REITs managing properties where activity remains robust. More importantly, once the nationwide lockdown eases, foot traffic can serve as a leading indicator of a return of economic activity across industries.

May 2020: Do Markets Yearn for the Dog Days of Summer: COVID, Climate and Consternation

Stakeholders are turning to untraditional data sources to quantify the impact of the COVID-19 shutdown. While no single variable can forecast which locations will be most susceptible to the virus, mounting scientific literature suggests that there is a correlation between temperature and viral propagation. If correct, regions in the temperature 'target zone' may need to implement more stringent lockdown policies for a longer period to achieve comparable mitigation.

Investors can combine weather data with property data, to expose one dimension of risk for Real Estate Investment Trusts (REITs) of prolonged closures, as well as areas that may see a resurgence of the virus later this year.

April 2020: Cold Turkey - Navigating Guidance Withdrawal Using Supply Chain Data

A recent surge in corporate earnings guidance withdrawals has left decision-makers missing a wrench in their toolbox. Corporate guidance was already declining, in 2018, when the number of companies in the Russell 3000 providing guidance peaked at 1,721, dropping 6.9% year over year in 2019 to 1,632 companies. Guidance has been further impacted by the

Coronavirus pandemic – 173 companies withdrew their previous guidance in the first quarter. This leaves decision-makers looking for alternative forward-looking information on a company's prospects.

April 2020: Data North Star - Navigating Through Information Darkness

Crisis creates uncertainty. Familiar landmarks lose their value and decision makers are left to navigate on partial information. Following the outbreak of the COVID-19 pandemic, this is the environment in which investors and corporate decision-makers now suddenly find themselves. The S&P Global Quantamental Research team has launched a series of research briefs that will aid decision-makers in navigating this uncertain environment. Utilizing non-traditional datasets across the entire S&P Global Market Intelligence product suite, these briefs will provide market participants with analysis on COVID-19's impact to the financial markets geared to fill the current information gap.

March 2020: Long Road to Recovery: Coronavirus Lessons from Supply Chain and Financial Data

COVID-19 continues to disrupt global supply chains in unprecedented ways. Leveraging maritime shipping data from Panjiva, this report includes a review of trade and financial data to analyze the impact of the SARS-CoV-2 / COVID-19 coronavirus outbreak. Findings include:

- Second-order supply chain effects are also emerging with the apparel industry now seeing a shortage of materials globally due to earlier outages in China.
- Retailers including Costco and Target are gaining from increased sales of health- and personal care products. Yet, supply shortages are rapidly emerging in part due to medical supply export restrictions in several countries.
- There is a notable, but not statistically significant, relationship with firms with higher exposure to Asia having seen a weaker sector neutral stock price performance.

February 2020: Ship to Shore: Mapping the Global Supply Chain with Panjiva Shipping Data in Xpressfeed™

World merchandise trade accounted for an estimated $19.7 trillion in 2018, about 90% of which is by sea. While financial data tells us "how a company has done in the past," shipping data provides a closer-to-real time indicator of "what a company is doing now." Panjiva's shipping data allows investors to track trends, identify anomalies, and assess risks for companies engaged in international trade. This paper illustrates how to find investment insights in Panjiva's US seaborne and Mexican datasets using the US auto parts industry as a case study.

Findings include:

- Shipment trends often lead fundamentals: Rising shipments amid flat or declining fundamentals may signal future financial trend reversal
- Growth in the number of a company's suppliers and in the types of products it imports may signal strengthening demand and/or product line diversification.

- Tracking industry-level product-line trends can help identify companies with significant exposure to rising or declining product lines.

January 2020: Natural Language Processing – Part III: Feature Engineering Applying NLP Using Domain Knowledge to Capture Alpha from Transcripts

Unstructured data is largely underexplored in equity investing due to its higher costs. One particularly valuable unstructured data set is S&P Global Market Intelligence's machine readable earnings call transcripts.

- Topic Identification – Firms that referenced the most positive descriptors around their financials outperformed historically.
- Transparency – Firms that provided greater call transparency exhibited by executives' behaviors and decisions outperformed historically.
- Weighted Average Sentiment – Quantifying call sentiment using a weighted average construct led to better returns and less volatility historically.
- Additive Forecasting Power – The newly introduced signals demonstrated additive forecasting power above commonly used alpha and risk signals historically.

December 2019: The "Trucost" of Climate Investing: Managing Climate Risks in Equity Portfolios

Does sustainable investing come at a "cost", and is the fear of investors around the performance concessions of "green" portfolios warranted? Our latest research suggests investors' fears are misplaced – carbon-sensitive portfolios have similar returns and significantly better climate characteristics than portfolios constructed without carbon emission considerations. Other findings include:

- Highly profitable firms are likely to be leaders in reducing their carbon emission levels.
- There is no degradation in fundamental characteristics for the carbon-sensitive portfolios compared to the baseline portfolio, even though the difference in constituents can be as high as 20%.
- Carbon-sensitive portfolios were observed as having significant reductions in water use, air pollutants released and waste generated.

October 2019: #ChangePays: There Were More Male CEOs Named John than Female CEOs

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