



Inside S-Factor: A Source of Alpha and a Greater Understanding of Materiality

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About the Firm

The S-Factor is a data analytics company focused on the Social Factors of ESG. The company provides the deepest set of social impact data, largest number of social data points and standardized norms-screens currently available on the entire ESG market.

As subject matter experts and veterans in measuring social impact around the world, the S-Factor helps the SRI/ESG, alternative data market, asset managers, and investors make more informed and impactful investment decisions. The firm sells company and country ESG data, ratings, index and analytics for compliance, risk and hedge. Utilizing a combination of machine learning, NLP, big data and subject expertise, the S-Factor has managed to solve three major ESG data supply challenges;

1. **The Social Data Gap:** S-Factor defines a universal standard derived from existing global regulations for social criteria from which companies and countries can measure social change and impact.
2. **Quantification:** S-Factor quantifies the perceived immeasurable, soft social content. We demystify, with empirical evidence, that social information is in fact tangible, measurable and quantifiable using the S-Factor methods.
3. **Returns:** S-Factor has developed a quantitative model to achieve excess returns whilst investing with social purpose.

Today, The S Factor Co. serves some of the world's largest asset and portfolio managers with greater insights into their investment companies risks and impacts - where they do business and throughout their supply chains.

About the CEO



Bonnie-Lyn de Bartok, Founder and CEO brings over two decades of Social Impact Measurement and Management, International Business, Finance and Technology background to the leadership of The S Factor Co.

Bonnie Lyn has won several entrepreneurial and technology awards, led the creation of two firms, has worked across 59 countries, leading the creation of exceptional teams, and several proprietary products including the MSPI™ (2010) and the S Factor™ Solutions (2016).

She developed a proprietary taxonomy, algorithm and index that measures corporate social impact against, international standards, public sentiment, and financial performance. She is a widely acknowledged expert and much sought-after speaker on social impact and risk issues.

A graduate from Saint Mary's University, in International Development Studies (Development Economics) and International Politics, Marketing, Finance and Micro-computer Technology.

A true visionary and thought leader, her ideas have been published by Alternative Watch, Medium, Bloomberg, BNN, the Wall Street Journal, Morningstar, TEDx, The Canadian Business Journal, The Globe Investor, and the TMX Blog. Recent awards include Private Asset Management Awards – Finalist (2022- pending), MassChallenge Cohort (2022), UBS Future of Finance, Sustainable Finance Fintech, 1st place winner (2021), AIFINTECH100, Global Top 100 Innovator of the Year (2021), Eagle Alpha ESG Hackathon Winner, New York (2021), Canadas Top Women in Fintech - Finalist (2021), 35 Best Predictive Analytics Start-ups in Toronto (2021), Private Asset Management Awards, ESG Advocate of the Year – winner (2020), TiEcon Global Top 50 Start up, Silicon Valley (2019), Women in Wealth, Finalist (2018), and Women of Influence, Finalist (YOY 2015-2019).

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Introduction

The purpose of this report was to seek external validation and back test various methods, approaches and strategies originally designed by The S Factor Co. which correlate Social Factor™ scoring methods with financial outcomes. The S-Factor first began testing this theory in 2010, producing The World’s First Social Performance Index known then as the MSPI (MacCormick Social Performance Index). MacCormick is S-Factor’s parent company and the predecessor to the data algorithms from which The Social Factor Data Company was born, nee The S Factor Co.

S-Factor engaged several analysts to conduct early testing on behalf of the firm internally, but ultimately partnered with two external firms to run the diagnostics and confirm the original prognosis.



The first is quantitative legend, Herb Blank.




Herbert Blank is President of Quant Pioneers LLC, a consulting firm specializing in quantitative investment research. He has more than 30 years of experience in financial product innovation and quantitative analysis. Prior employers and major engagements include S-Network Global Indexes; Rapid Ratings; QED International Associates; Deutsche Bank; Value Line; Fidelity Bank (now Wells Fargo); XShares Fund Management; New York Life Investment Management; NYSE; World Gold Council; Barclays Global Investors; and Dow Jones Global Indexes.

Recognized as a pioneer in the Exchange Traded Fund (ETF) industry, Herb worked with Deutsche Bank’s team of attorneys and the SEC to establish the fund structure with portfolio management, securities lending, and reinvestment of dividends used commonly today in the ETF industry. Prior ETFs, such as SPDRs, used the less flexible Unit Trust structure. The ETF family of nine funds, known as Country Baskets Index Fund, were the first to trade on the NYSE and Herb was Portfolio Manager. After that, Herb founded the consulting firm QED International Associates, Inc. where he worked on the product development and launch of iShares, GLD, and X Shares. At the same time, he assisted in the development of the construction and maintenance methodologies for the Dow Jones Global Indexes.

Herb has considerable experience in working with unconventional and alternative data sets and applying them to investment applications. His work in developing SRI and ESG indexes and portfolios since the Fidelity Social Responsibility Fund in 1987 fall into this category. He helped create the methodology and construction and maintenance rules for the Thomson Reuters / S- Network ESG Best Practices Ratings and Indexes.

Herb frequently publishes industry white papers and articles; a publications list is available upon request. Mr. Blank also serves as Steering Committee chairman for QWAFEFW, an industry society for quantitative analysis and investment professionals. His MBA in Finance is from NYU Stern; his BA in Mathematics is from University of Pennsylvania.

 **Boosted.ai** In the second instance, we partnered with the firm called Boosted.ai, who has developed an artificial intelligence software for investment managers to create value in their equity portfolios.

The Boosted Insights platform learns from and identifies patterns that generate additional opportunities for institutional investors. No background in coding or data science needed. In this instance, S-Factor supplied Boosted with back test data using the S-Factor scoring model as a signal from which to detect or determine alpha. This resulted in S-Factor risk adjusted returns quantified with an outstanding alpha signal in virtually near real-time. The quantitative results of which have also been validated by Herb Blank.

Subsequent to the firms 2020 release of, The S-Factor Theory of Change, we look forward to now sharing with you our case studies and several test results applying this theory, in the following report.



Bonnie-Lyn de Bartok
Found & CEO, S-Factor

Abstract

ESG investing involves three pillars: environmental, social and governance. However, for much of the past 25 years, investors focused much more on the environmental and governance issues than the social issues. Recent studies have shown strong relevance of social pillar data and scores to investment returns and limiting return volatility. Despite this, many investment managers resisted social-factor investing because they did not understand the taxonomies behind it and why they are relevant indicators of management quality. During the past three years in particular, more institutional recognition of the importance of diversity and inclusion and other best societal practices have begun to turn the tide. Increasingly, that evidence is being supplied by next-generation data companies such as The S Factor Co.

The S-Factor and its data are not new. They were introduced to the market in 2010 and have many consumers today. The S-Factor model incorporates and originates millions of data points to measure the investment value of different social metrics. A key difference is the ongoing collection of non-standard data and the calibration of effectiveness related to each indicator. The model also quantifies how material each metric has been during recent and historical time periods.

This report provides verification of four distinct studies that tested potential S-Factor contributions to investment performance. Returns and statistics for all four studies are calculated in both Canadian and US dollars - each case labeled accordingly.

The first example is a case study of the potential to improve returns of an active manager's portfolio. The second example looks at the ability to differentiate between the return potential for stocks that are in high-impact industries environmentally but with very different social metric scores. The third study tests S-Factor's ability to create superior index portfolios as well as its ability to differentiate between winners and losers with respect to an extended index of Canadian stocks. The fourth study was performed on the Boosted.ai artificial intelligence platform on which portfolio managers can input a custom file of ranks or potential alpha signals and apply Boosted's tools to produce AI-optimized portfolios. In study #3 and study #4, the magnitude and consistency of the information coefficients are also reviewed.

In the penultimate section of this report analysis' the implications of these results and explores possible use cases before concluding sentiments.



ESG Investing, Social Factors and Materiality

Too often investors focus only on the E and the G in ESG investing: the environmental and governance factors. In the decades-long struggle for acceptance of ESG investing, the “S” factor represented by the social pillar of the three pillars constituting ESG has been the least understood and the most resisted. Respected academics from Frank Fabozzi to Mark Kritzman have written articles proclaiming that social factors, by their nature, cannot be relevant to investors. They claimed any factors not on financial statements are irrelevant to corporate profits.

This assertion was weakened considerably by financial statement experts in 2007. New York University accounting professor Baruch Lev has led a contingent of accountants in demonstrating that traditional balance sheets only account for approximately 30% of the value of the companies of the S&P 500. Alternative accounting data related to what used to be referred to as “intangibles” accounts for the missing 70%. Most of these intangibles relate to best ESG practices.

During the past ten years, the resistance has begun to change. There is now recognition that there is more to ESG investing than excluding stocks and industries engaged in “sinful” activities. Indeed, respected companies such as MSCI, Refinitiv, ISS, Sustainalytics and others now provide data and publications to tens of thousands of investment companies defining and quantifying scores of data points in each pillar including the social pillar. Once these data were available to researchers, published articles in investing journals substantiated strong relationships between social pillar scores and subsequent five-year return on equity. Subsequent academic, corporate studies and investor initiatives have also led to more recognition of the importance of developing diversity and inclusion in human capital and other differentiating corporate citizen data generally included in the social pillar with some overlap to governance. Citations on this research are available in the reference section.



Inside the S-Factor Model

The nucleus of the S-Factor model measures individual companies' socio-economic, socio-cultural, and socio-political impact on people, starting with its employees, and incorporating the systemic impact in the communities where it does business.

Highlights from the comprehensive taxonomy screen for the largest number of social criteria across the entire ESG market - structured by 6 categories consisting of 74 social impact themes, and thousands of metrics. The broader context of the external landscape of where the companies do business is also provided to facilitate region-specific and industry-specific comparisons. These performance data provide deep-analytics and materiality of each metric in relation to hundreds of possible queries.

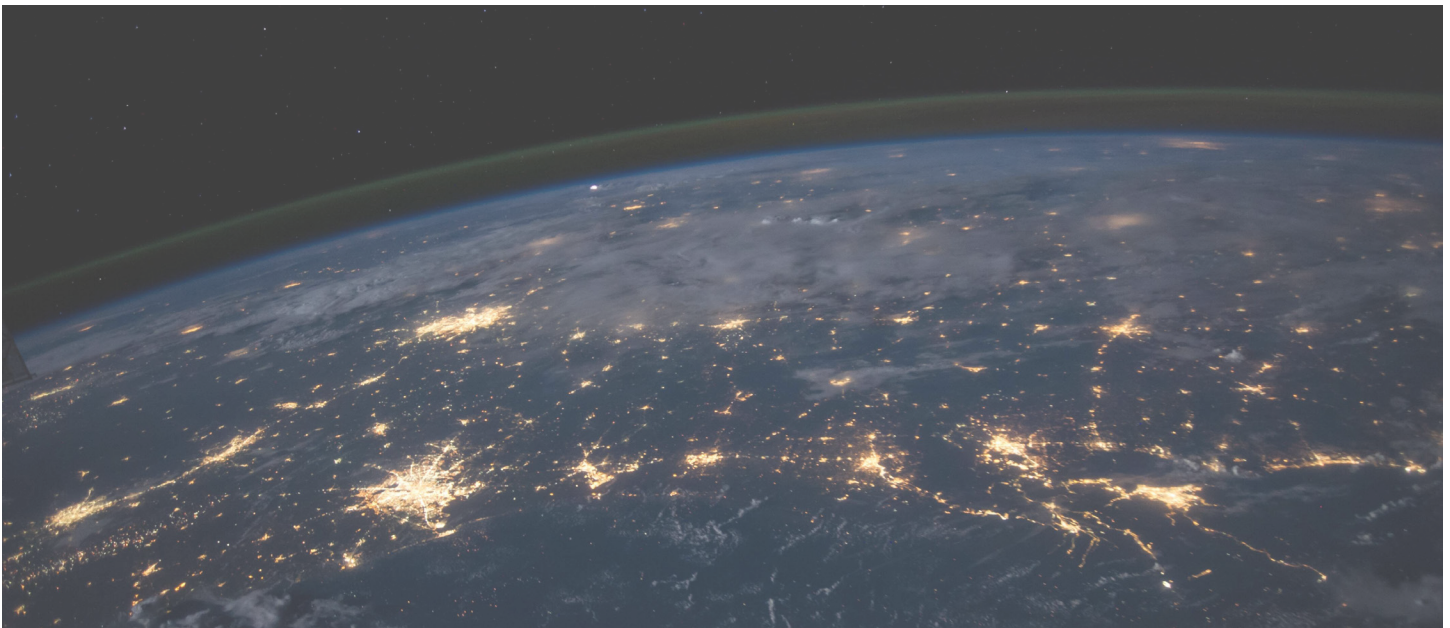
The S-Factor sources three different kinds of information to inform its metrics;

- Company Supplied
- External to Company, Material Qualified
- Sentiment Data

As part of the process, data from unstructured sources are mapped to regulation norms utilizing the S-Factor theory of change in the fundamentals of value capture. These sources are then passed through S-Factor's machine learning solution and analysts who then validate the relevancy of each input and provide a score for the company based on this methodology.

By monitoring external sources (not just company provided information) S-Factor provides a more comprehensive picture of a company's social performance, avoiding any potential bias or impact-washing. Most data are updated daily to ensure the S-Factor data is current, while some 3rd party data is updated as it is made available (daily, weekly, or monthly). There can be a two- to three-day lag in some data to allow for quality control, as files are regularly compared to existing data for updates/corrections.

S-Factor currently covers approximately 10,000 companies – the bulk of global publicly listed equities – with a minimum of seven years of historical data, beginning January 1, 2015 and is now incorporating additional data sets to further broaden its coverage. The data allows the user to drill-down into standardized, norms-based social risks and impacts across a company's operations and throughout its supply chain. Now through the confluence of technology, larger data sets and greater interest in ESG on the part of investment firms.



Architecture of the Studies

Four separate studies were reviewed and vetted for this report. The purpose of each of the four studies was to examine the potential for asset managers to extract risk-adjusted total return differentials, otherwise known as alpha, from S-Factor data. For differentiation purposes, they are henceforth referred to as Study #1, Study #2, Study #3 and Study #4. Returns and statistics for all four studies are calculated using either Canadian or US Dollars as they are labelled.

Study #1: The first test that we analyzed for this review was designed to test the efficacy of the S-Factor in discerning between year-ahead winners and losers of an active manager's portfolio of 35 stocks. At the beginning of each year, all of the stocks in the portfolio were ranked by their S-Factor scores. The top 7 stocks, or 20%, was tracked as the Buy portfolio and the bottom 7 stocks, also 20%, was tracked as the sell portfolio. In keeping with actively managed changes, positions were changed based on monthly monitoring of "outlier" events with outliers defined as fluctuations in score of 10 points or more on a 100-basis point scale.

Study #2: The second test was designed by a graduate student, working as an analyst intern for S-Factor, originally for the Eagle Alpha ESG Hackathon in June of 2021. It turned out to be a winning entry. A long-short portfolio was constructed consisting of six companies across the automotive and energy industries based on the predictive factor derived from monthly S-Factor scores. The three companies in each industry were selected on the basis of similar size and market profiles in order to create the closest possible comparisons. The list of companies in the test included: Exxon, Chevron, and Royal Dutch Shell. Automobile industry: Toyota, Ford, Volvo. The test period was 60 months with a full reconstitution and rebalancing performed every five months.

Specifically, for each re-balancing period, the following algorithm was used:

1. Calculate the signal based on SF scores
2. Rank the stocks in each industry according to signal
3. The top two stocks, constituting 33% of the sample, represented a given period's long portfolio. Conversely, the short portfolio was comprised of the bottom two stocks.
4. Hold the portfolio for the five-month period, then return to step 1 for rebalancing.

Study #3: The third study, performed by Boosted.AI focused on the five-year period ending January 28, 2022 and confirmed for this report. It focused on the largest 250 companies listed on the TMX that had an S-Factor score history. With a much larger selection universe and larger resultant portfolios, this study is more quantitatively robust than Study #1 and Study #2.

Methodology,

1. Identify the selection universe as the largest 250 companies listed on the TMX for which S-Factor scores are available.
2. Calculate the signal based on SF scores.
3. Rank the stocks by the signal.
4. Divide the universe into five quantiles.
5. The top 50 stocks, constituting 20% of the sample, represented a given period's long portfolio. Conversely, the short portfolio was comprised of the bottom two stocks.
6. Hold the portfolio for a 12-month period, then return to step 2 for rebalancing.

Portfolios were rebalanced monthly for the 60-month time period beginning January 1, 2017 and ending January 28, 2022. The performance was recorded on a monthly basis. The benchmark selected for the test was the iShares Core S&P/TSX Capped Composite Index ETF a benchmark index-based exchange-traded fund with the ticker symbol CIS.

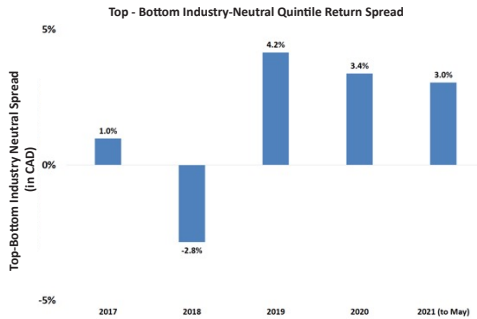
Study #4: This study tests the ability of a portfolio manager to use a commercially available artificial intelligence (AI) platform such as Boosted.AI to create superior portfolios utilizing the signals from S-Factor. The universe were the constituents of the flagship MSPI Social Performance Index produced and maintained by S-Factor Company. The MSPI is S-Factors' Global Best in Class, Social Factor Index. It measures companies' social performance in relation to their compliance, best-practice norms, public sentiment, external risk factors and financial performance. The MSPI screens all companies listed on major stock exchanges spanning the globe for sufficient data availability. The remaining universe is screened again for a threshold of 30% social impact topic coverage. The MSPI then includes those stocks maintaining a minimum average grade of C+ for the fiscal year. The index is monitored and adjusted quarterly.

The MSPI constituent universe was tested using the Boosted.AI system and verified by several analysts for this report. The study focused on the seven-year period commencing January 1, 2015 and ending January 31, 2022. With a much larger selection universe and larger resultant portfolios, this study is more quantitatively robust with regard to global stock performance than the prior three studies.

Methodology

1. Using the Boosted.AI platform's proprietary algorithm assembling multiple ML techniques, set the available objective functions while otherwise maximizing exposure to S-Factor's S – signal
2. Reconstitute and rebalance quarterly for every calendar quarter between January 1, 2015 and January 31, 2022 with the new S-Factor scores on the quarter-ending date.

Results of Tests



Study #1 was a first pass at determining whether using the S-Factor as a screen could improve a randomly selected active manager’s portfolio. A long-short portfolio of the return enhancements by S-Factor result in 20% excess returns for the period. That is and the accuracy for predictive results was correct 60% of the time.

For examples of individual companies review within the portfolio such as: United Health Group (UNH), Bayerische Motoren Werke (BMWYY), Bank of Nova Scotia (BNS), Alphabet (GOOG) please refer to **Appendix 1**.

Figure 1: The annual long-short spreads averaged 20% per annum.

Study #2 focused on six mega-cap stocks selected from two high impact industries to see how effective S-Factor could be in an area of the US market renowned for price efficiency. This ESG Hackathon entry used a running back test of pairs trades that spanned past five years. It was compared against a “naïve” portfolio using two of the six stocks picked at random. In both cases, five-month holding periods were used prior to reconstitution. The test proved to be duplicable for the purposes of this report. For the period, a paired long-short portfolio produced an annual alpha of 2.07 compared with an alpha of -0.01% using the naive non-predictive factor. The alpha of the S-Factor pairs-trade outperformed the naïve trade by more than- 53 times in absolute terms. The S-Factor pairs produced 10 percent annualized returns, versus a cumulative 20 percent loss in the naive cases. Portfolio turnover was quite low at annual average of below 50%.

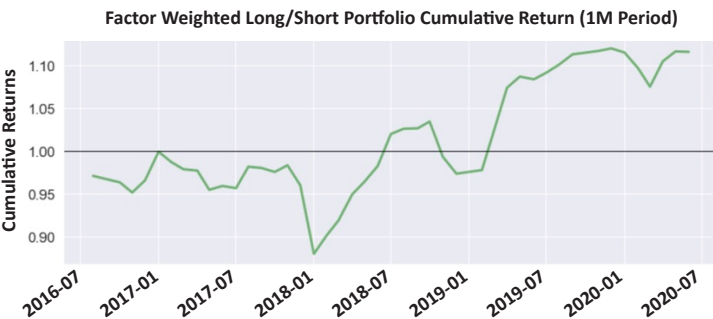


Figure 2: Study was an actual winning entry at the Eagle Alpha ESG Hackathon.

SF Scores Spearman Rank IC	1M	5M	10M
IC Mean	0.075	0.117	0.135
IC Std.	0.420	0.456	0.402
Risk-Adjusted IC	0.178	0.256	0.336
t-stat(IC)	1.183	1.697	2.227
p-value(IC)	0.243	0.097	0.031
IC Skew	-0.392	-0.513	-0.420
IC Kurtosis	-0.474	-0.710	-0.556

Figure 3: The judges found the 200 basis points of alpha combined with statistically significant Information Coefficients (ICs) to be quite impressive.

The information coefficient (IC) of the S-Factor predictive model registered more than three times higher than the naive case. This value is statistically significant at a 95% confidence level. These are very high IC’s for a five-year series of investment portfolios and likely contributed to the success of this study being a winner at the ESG Hackathon.

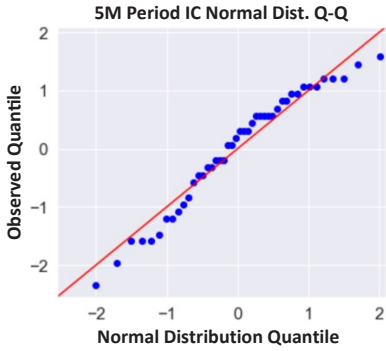


Figure 4: The fit between the observed data and the normal distribution is unusually tight.

Returns Analysis

SF Scores return analysis	1M	5M	10M
Ann. alpha	1.256	2.071	1.026
beta	0.080	0.135	0.079
Mean Period Wise Return Top Quantile (bps)	67.734	51.128	47.102
Mean Period Wise Return Bottom Quantile (bps)	-24.969	-69.277	-48.544
Mean Period Wise Spread (bps)	92.704	122.109	96.188

Figure 5: The magnitudes of the spreads between the top and bottom quantiles were amazing.

Study #3 applied the S-Factor as the sole differentiator in choosing a long-only portfolio. It was benchmarked against CIS, an exchange traded fund from iShares by Blackrock based upon the S&P/TSX Capped Composite Index.

Portfolio returns

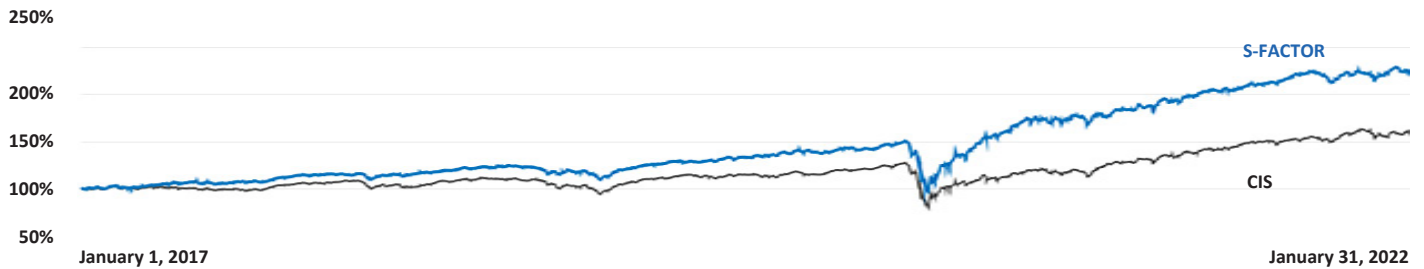


Figure 6: The consistency of the steady outperformance of the S-Factor-enhanced portfolio combined with its magnitude demonstrates its potential application for institutional long only portfolios.

Since inception, the machine generated portfolio has an annualized return of **16.74%** which translates to **8.56%** annualized against the benchmark return of **9.18%**.

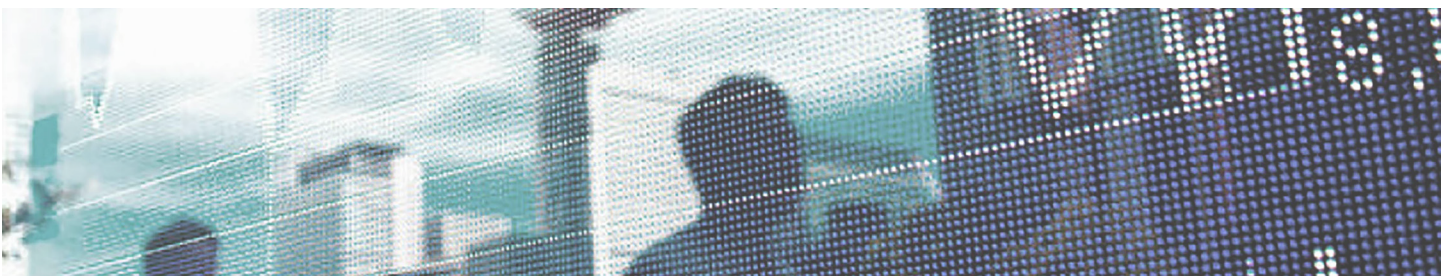
The top-line results:

118.81% Cumulative Return for S-Factor Portfolio	16.74% Annualized Return for S-Factor Portfolio	0.88 Beta
55.93% Cumulative Return for Benchmark Portfolio	9.18% Annualized Return for Benchmark	8.56% Annualized Alpha
		0.99 Sharp Ratio†

†using 0.5% annual as risk-free rate of return

Return Quantities:

17.50%	12.81%	8.07%	8.62%	7.76%
Top Quantile	Second Quantile	Third Quantile	Fourth Quantile	Fifth Quantile



Hit Rate

Percentage of times that the star rating had positive excess return relative to the median excess return of the universe per time period for the model.

	5D%	1M%	3M%	1Y%	2Y%
5 ★	53.09	54.33	55.82	55.58	56.08
4 ★	51.71	52.64	53.90	54.02	55.49
3 ★	49.55	50.60	49.99	51.92	51.07
2 ★	49.34	49.17	48.55	48.90	47.86
1 ★	46.30	43.26	41.73	39.58	39.49
Median	50.00	50.00	50.00	50.00	50.00

Excess Return

Median excess return per time period per star for the model, beta-adjusted unless toggled off (Portfolio Settings/Evaluation/Excess Returns Relative to Beta).

	5D%	1M%	3M%	1Y%	2Y%
5 ★	0.09	0.33	0.82	0.28	-0.01
4 ★	0.04	0.18	0.51	-0.27	0.10
3 ★	-0.08	-0.06	-0.39	-1.20	-2.24
2 ★	-0.11	-0.33	-0.87	-2.73	-4.88
1 ★	-0.44	-1.75	-3.85	-11.19	-17.07
Median	-0.05	-0.14	-0.38	-2.06	-2.90

The long-only returns showing an 850-plus basis point annualized advantage with a lower Beta and slightly lower standard deviation is very impressive. Empirical return data, consistent with academic research, show that consistently higher portfolio returns can only be generated by taking extra-risk by more volatile stocks, using leverage or both. That said, managers that follow such a process rarely outperform the benchmark and rarely produce returns that compensate for the extra amount of risk assumed. That makes these findings extraordinary. The S-Factor portfolio almost doubled the performance of the CIS benchmark while outperforming by more than 800 basis points during an up-market period with lower volatility.

Examples of individual companies’ performance within the TMX universe such as BCE Inc. (BCE) and Hydro One Limited (H) please refer to **Appendix #2**.

Study #4 applied the Boosted.ai Platform to 7.1 years of S-Factor data within the seven-year period commencing January 5, 2015 and ending January 28, 2022., then reconstituted and rebalanced the portfolios quarterly. Two comparative benchmarks are used to measure total portfolio performance, the S-Factor’s equally weighted MSPI and the ETF representing the most used institutional index for global stocks, MSCI ACWI (All Country World Index). The MSPI has historically been the harder index of the two for portfolio managers to outperform against in terms of total return.

The top-line results:

252.28% Cumulative Return for AI-Boosted S-Factor Portfolios	19.41% Annualized Return for S-Factor Portfolio	0.92 Beta
157.96% Cumulative Return for MSPI Benchmark Portfolios	14.28% Annualized Return for Benchmark Portfolio	5.7% Annualized Alpha
102.45% Cumulative Return for ACWI, iShares MSCI ACWI ETF	10.48% Annualized Return for ACWI, iShares MSCI ACWI Portfolios	1.30 Sharp Ratio†

†using 0.5% annual as risk-free rate of return

Return Quantities:

15.9%	13.5%	14.2%	12.2%	12.7%
Top Quintile	Second Quintile	Third Quintile	Fourth Quintile	Fifth Quintile

These impressive long-only returns demonstrate a 500-plus basis point annualized advantage.



Implications for Investors

There are many implied uses for investment application supported by these backtests. As an evidence-of-usefulness test, **Study #1** shows that a way that S-Factor scores could potentially help an active portfolio manager screen out stocks with high exposure to social risk while adding incrementally to positions with the highest S-Factors scores. An example of large incremental alpha with only one portfolio is not statistically significant. It is, however, indicative when combined with the other tests, that it is worthy of the time and resources of a fundamentally driven investment management company attempting to become more “quantamental” to test these data against their historical portfolios to see if value would have been added. This supports the concept that quantitative data are not just for quants but can be used by active management teams to increase long-only portfolio performance.

Study #2 supports a more common use of quantitative data: pairs trading. The fact that the S-Factor-driven pairs outperformed the naïve long-short pairs by more than 50 times over a five-year period on an absolute basis is impressive. The magnitudes of the statistically derived information coefficients (ICs) are perhaps even more noteworthy. Using an ESG-investing lens, the fact that such robust results were achieved using pairs in high-environmental industries can be construed as an “aha moment.” The factor seems to be especially perceptive in distinguishing among companies that have good Environmental scores by greenwashing from those that have a proactive culture that actually fulfills the impactful promises the companies have made in their policy statements.

Study #3 has an impressive stepwise distribution, except for quantiles 3 and 4 being almost identical, between quantiles 1 and 5. This also supports the hypothesis that S-Factor provides strong signals for long-short applications.

The long-only results of Study #3 provides evidence of potentially great value-added for more conventional portfolios. Most active portfolios show negative alpha relative to the benchmark. This was especially true in a period that included February through April 2020 characterized by a steep decline immediate followed by a rapid resurgence led by large cap stocks. In most cases, active managers were left in the dust with backwards-looking financial data focused on valuation. These results show that using an equally weighted portfolio using the forward-looking and predictive data points found to be material in S-Factor scores added prodigious alpha in an environment when large cap stocks were dominant.

Many backtests show impressive outperformance during selected periods. Very few can outperform during a bull market dominated by large cap stocks with an equally weighted portfolio with a Beta below 1 and lower standard deviation. The fact that the S-Factor portfolio accomplished this feat with no technical or fundamental information would make such portfolios tailor-made for index products such as ETFs and ESG-focused derivatives.

Study #4 has the broadest applications for today’s investment world focused more than ever on adding value through combining access to non-traditional datasets such as S-Factor with modern technology. Artificial intelligence platforms such as Boosted.ai provide a means for portfolio managers to attempt to combine such data with their existing strategies. A popular term for this combination is quantamental. Formerly exclusively in the domain of hedge funds, quantamental processes are increasingly being adopted by traditional and active ETF managers.

The results of Study #4 display the effectiveness of applying Boosted.ai platform technology focused on S-Factor data to one of the broadest possible universes. It included all listed stocks on major exchanges across the globe that meet the test’s basic liquidity requirements and with enough data to calculate S-Factor datapoints and signals. That is as broad or broader than the universe of liquid stocks used by most portfolio managers.

The study used two baselines for comparison, the proprietary MSPI and the ACWI ETF. Both are explained in the prior section. The annualized performance of the AI-boosted portfolio outperformed the hard-to-beat baseline ACWI portfolio by a startling 893 basis points per year (+8.93 percentage points) for the seven-year period. The gross results show more than 203 basis point differential, nearly a 2.5:1 ratio in relative returns to the index. Also interesting are the comparison with MSCI. The annualized performance of the boosted portfolio is also about 530 basis points or 5.3 percentage points. The cumulative performance difference is about 100 basis points and a 1.5:1 ratio. This shows not only the significant outperformance of the boosted portfolio over the MSPI but the fact that the MSPI consistently outperforms ACWI. The accompanying graph showing the growth of a thousand dollars since 2015 further illustrates the dominance of the AI-boosted S-Factor portfolio over ACWI.

Also illustrated in the graph is that the boosted portfolio consistently is not only above but tracks the MSPI portfolio well. Additionally, the MSPI maintains a position consistently above ACWI making the MSPI an even tougher benchmark for managers to beat than ACWI. The latter differentiation makes the MSPI ideal for an ESG-themed ETF or institutional portfolio.

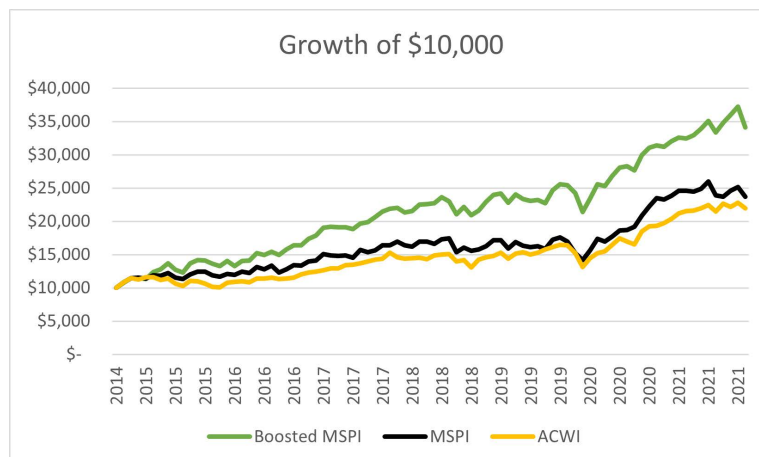


Figure 7. The consistent outperformance of the Boosted S-Factor portfolio over the S-Factor-based MSPI over ACWI demonstrates clearly that both the injection of the S-Factor, followed by the application of Boosted’s AI engine resulted in step-by-step significant improvements.

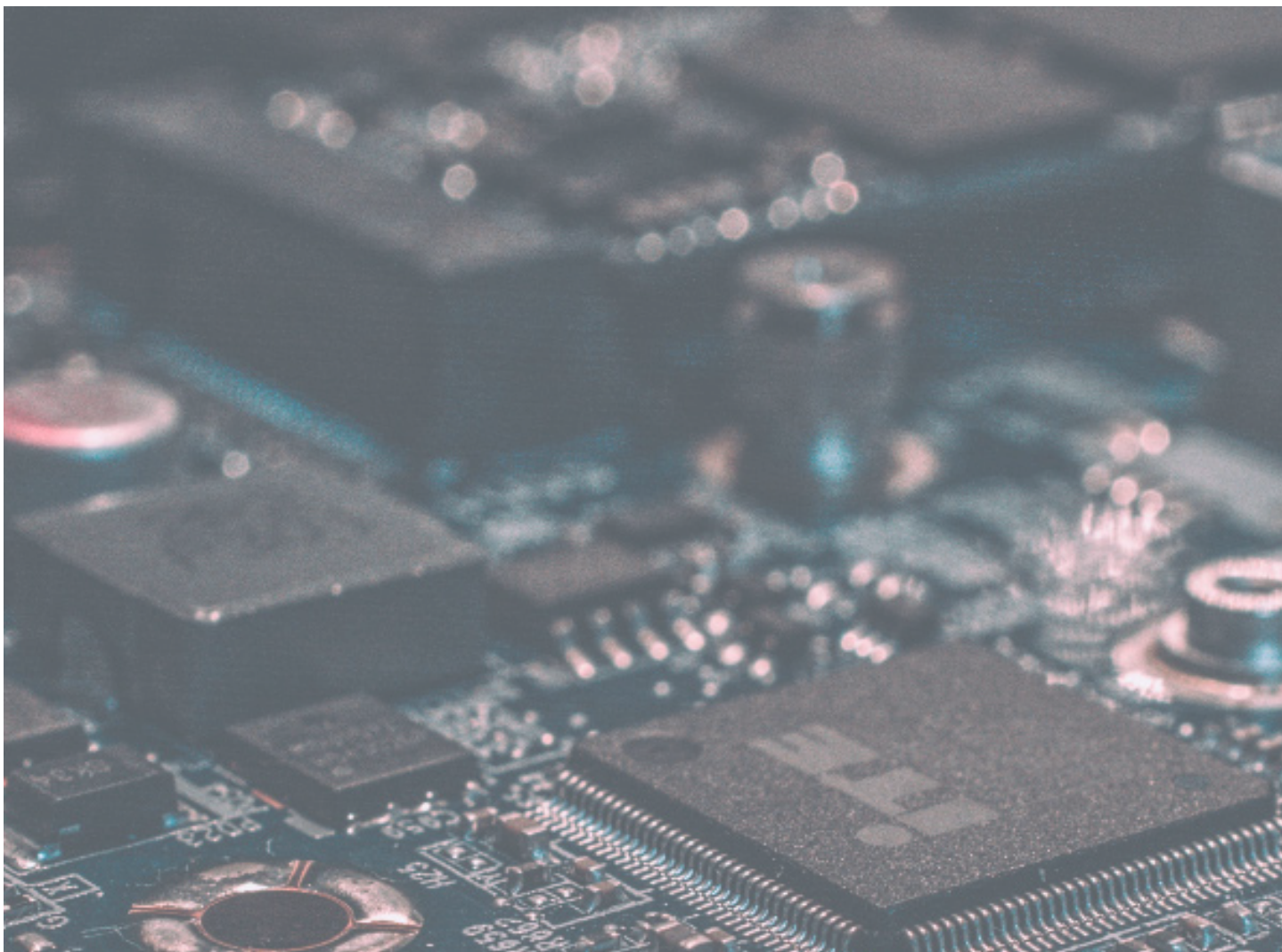
Summary

The S-Factor is more than a barometer of individual companies' socio-economic, socio-cultural, and socio-political impact on people. It is also more than a summation of its million-plus datapoints. An exhaustive amount of research, testing and technology have contributed to its ability to differentiate materiality of a social theme to a particular company and/or industry. It also maps each datapoint's relevance to alpha for companies and industries.

The studies show and this report illustrates clearly, that S-Factor scores also were an incremental source of alpha with many robust qualities during the past five years. These five-year tests generate much more versatility and robustness in S-Factor data than more conventional data sets.

This report verifies that the original tests were sound and replicable. Potential alpha applications include: "super-charging" returns of fundamentally driven long-only portfolios; several different types of long-short applications including pairs trading; the basis for index and quantitative portfolio products; and the basis for ESG-themed derivatives.

Quantitative analysts know well that the efficacy of factors tend is cyclical and even the most robust factors do not work in all environments. If the proof of the pudding is in the eating, then the proof of the data is in the testing. The only way a portfolio manager can know if these data will add value to a process is to utilize the data in their own processes.



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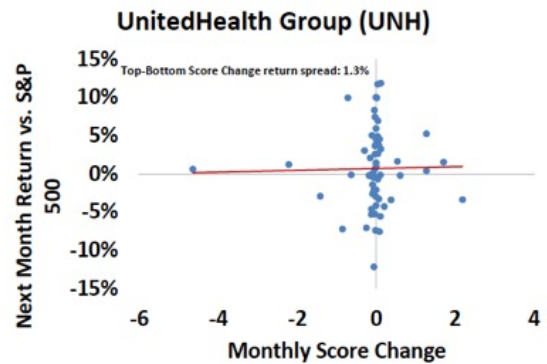
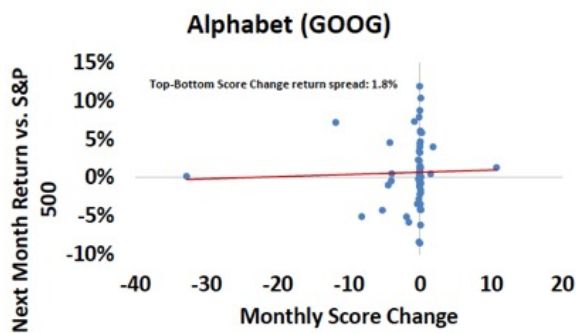
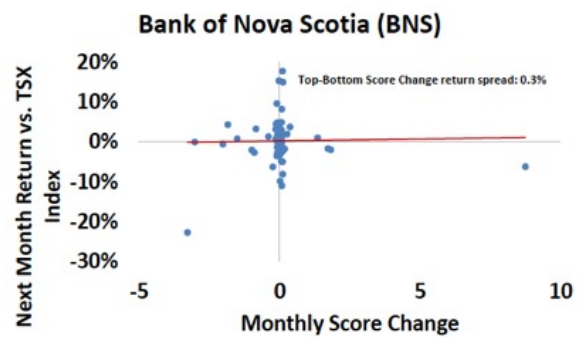
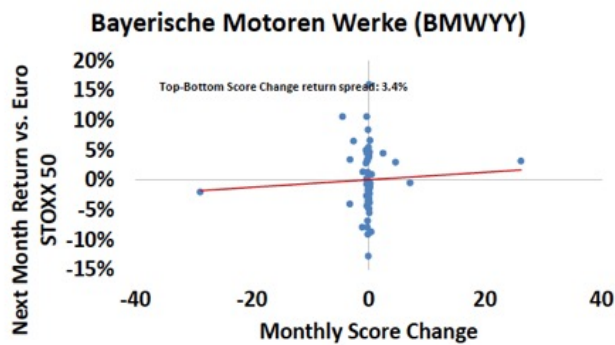
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Figure 2	10	Study was an actual winning entry at the Eagle Alpha ESG Hackathon.
Figure 3	10	The judges found the 200 basis points of alpha combined with statistically significant Information Coefficients (ICs) to be quite impressive.
Figure 4	11	The fit between the observed data and the normal distribution is unusually tight.
Figure 5	11	The magnitudes of the spreads between the top and bottom quantiles were amazing.
Figure 6	11	The consistency of the steady outperformance of the S-Factor-enhanced portfolio combined with its magnitude demonstrates its potential application for institutional long only portfolios.
Figure 7	13	The consistent outperformance of the Boosted S-Factor portfolio over the S-Factor-based MSPI over ACWI demonstrates clearly that both the injection of the S-Factor, followed by the application of Boosted’s AI engine resulted in step-by-step significant improvements.

Appendix

Appendix 1

Case Study #1 Individual Company Examples for United Health Group (UNH), Bayerische Motoren Werke (BMWYY), Bank of Nova Scotia (BNS), and Alphabet (GOOG).



The S-Factor revision model is effective across a variety of countries and sectors. Examples are shown from current and past Portfolio Fund holdings. Buy the outliers on the right, avoid the outliers on the left. We estimate the success rate of this model to be 60% or more, based on a sample of past Portfolio holdings.

Appendix 2

Case Study #3 Example Individual Company Analysis for BCE Inc. (BCE) and Hydro One Limited (H). Please see the following two pages.



Ratings

Star rating at each rebalance for BCE Inc. (BCE) from Jan 3, 2017 through Jan 24, 2022. Rating is generated for period when stock was part of the universe.



BCE Price History

Weekly closing prices for BCE Inc. (BCE) from Jan 03, 2017 through Jan 24, 2022.



Excess Return

Median excess return per time period per star for the model, beta-adjusted unless toggled off (Portfolio Settings/Evaluation/Excess Returns Relative to Beta).

	5D%	1M%	3M%	1Y%	2Y%
5 ★	0.09	0.33	0.82	0.28	-0.01
4 ★	0.04	0.18	0.51	-0.27	0.10
3 ★	-0.08	-0.06	-0.39	-1.20	-2.24
2 ★	-0.11	-0.33	-0.87	-2.73	-4.88
1 ★	-0.44	-1.75	-3.85	-11.19	-17.07
Median	-0.05	-0.14	-0.38	-2.06	-2.90

Hit Rate

Percentage of times that the star rating had positive excess return relative to the median excess return of the universe per time period for the model.

	5D%	1M%	3M%	1Y%	2Y%
5 ★	53.09	54.33	55.82	55.58	56.08
4 ★	51.71	52.64	53.90	54.02	55.49
3 ★	49.55	50.60	49.99	51.92	51.07
2 ★	49.34	49.17	48.55	48.90	47.86
1 ★	46.30	43.26	41.73	39.58	39.49
Median	50.00	50.00	50.00	50.00	50.00

Rankings (as of Jan 24, 2022)

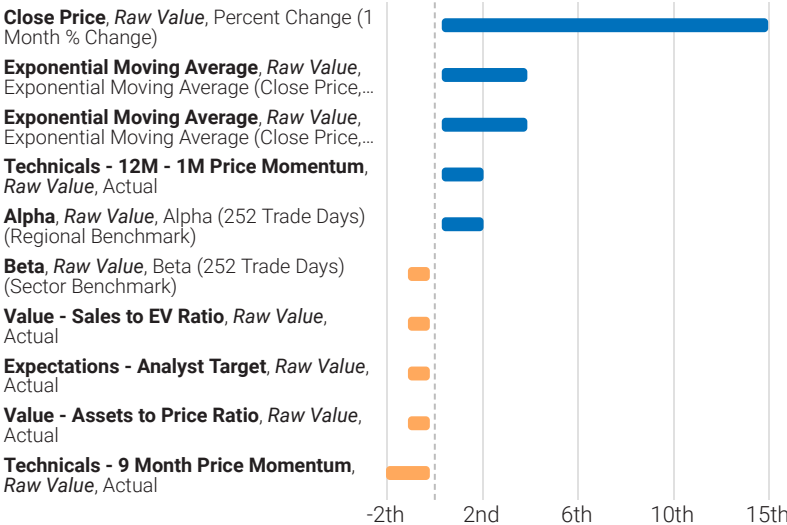
Rank: 3/225 Rank Delta: 2 Star Rating: 5★★★★★ Explain Score: +28.47

Positive Drivers (Explain Score/Data Score) Negative Drivers (Explain Score/Data Score)

+6.77 1%	Volatility <i>Raw Value</i> , Volatility (Close Price, 252 Trade Days)	-2 0%	Air Emissions Management <i>Local Z-Score</i> (256 Trade Days), Actual
+6.4 6%	Beta <i>Raw Value</i> , Beta (252 Trade Days) (Regional Benchmark)	-1.6 7%	Value - Common Dividend Yield <i>Raw Value</i> , Actual
+5.26 1%	SF Overall Score <i>Global Z-Score</i> (256 Trade Days), Actual	-0.49 76%	Expectations - Forward Free Cash Flow to Price Ratio <i>Raw Value</i> , Actual
+4.49 0%	Volatility <i>Raw Value</i> , Volatility (Close Price, 20 Trade Days)	-0.44 41%	Value - Assets to Price Ratio <i>Raw Value</i> , Actual
+1.71 0%	Air Emissions Management <i>Global Z-Score</i> (256 Trade Days), Actual	-0.42 5%	Expectations - Analyst Target <i>Raw Value</i> , Actual

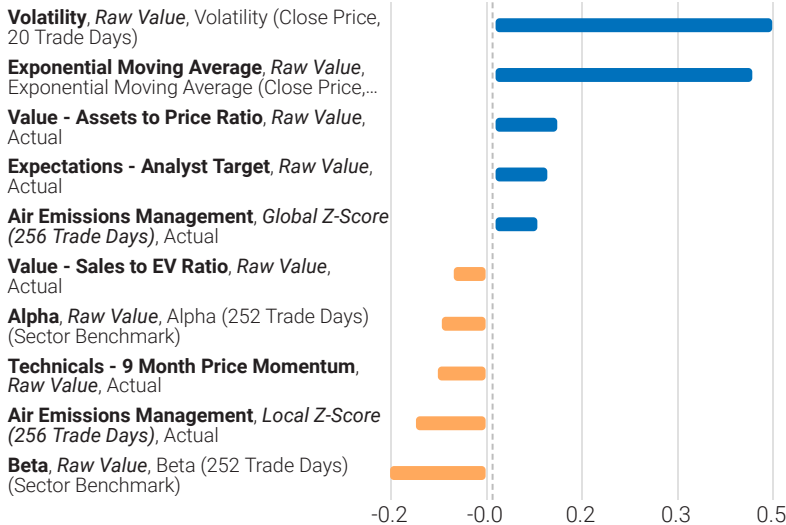
Percentile Deltas

Variables with the largest movement in percentile from Jan 17, 2022 to Jan 24, 2022.



Explain Score Deltas

Variables with the largest movement in explain score from Jan 17, 2022 to Jan 24, 2022.



Factor Timing

Momentum	Value	Volatility	Size	Trade Act.	Profitability	Leverage	IS*	Growth	Earnings Variability	Dividend Yield Actual	Dividend Yield	CF*	BS*	E/S/G
Q2	Q3	Q5	Q1	Q1	Q2	Q1	Q3	Q4	Q5	Q1	Q1	Q5	Q4	Q1/Q1/Q2

*IS/CF/BS stand for Income Statement/Cash Flow/Balance Sheet respectively.



Ratings

Star rating at each rebalance for Hydro One Limited (H) from Jan 3, 2017 through Jan 24, 2022. Rating is generated for period when stock was part of the universe.



Excess Return

Median excess return per time period per star for the model, beta-adjusted unless toggled off (Portfolio Settings/Evaluation/Excess Returns Relative to Beta).

	5D%	1M%	3M%	1Y%	2Y%
5 ★	0.09	0.33	0.82	0.28	-0.01
4 ★	0.04	0.18	0.51	-0.27	0.10
3 ★	-0.08	-0.06	-0.39	-1.20	-2.24
2 ★	-0.11	-0.33	-0.87	-2.73	-4.88
1 ★	-0.44	-1.75	-3.85	-11.19	-17.07
Median	-0.05	-0.14	-0.38	-2.06	-2.90

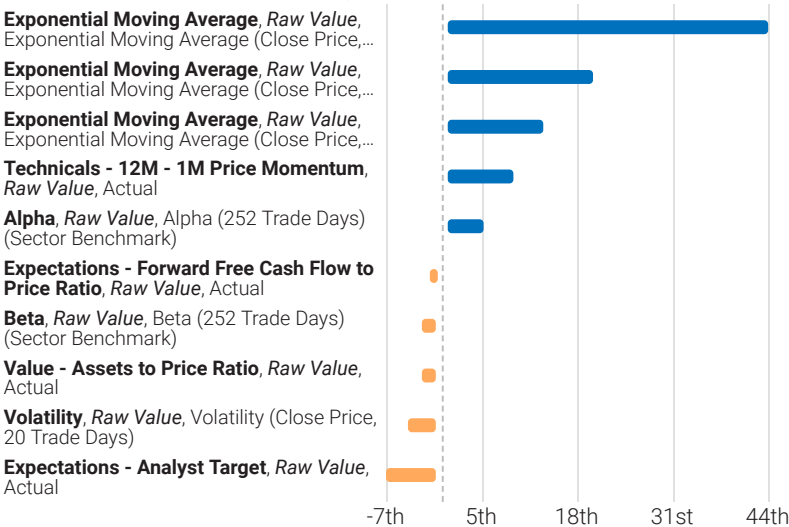
Hit Rate

Percentage of times that the star rating had positive excess return relative to the median excess return of the universe per time period for the model.

	5D%	1M%	3M%	1Y%	2Y%
5 ★	53.09	54.33	55.82	55.58	56.08
4 ★	51.71	52.64	53.90	54.02	55.49
3 ★	49.55	50.60	49.99	51.92	51.07
2 ★	49.34	49.17	48.55	48.90	47.86
1 ★	46.30	43.26	41.73	39.58	39.49
Median	50.00	50.00	50.00	50.00	50.00

Percentile Deltas

Variables with the largest movement in percentile from Jan 17, 2022 to Jan 24, 2022.



H Price History

Weekly closing prices for Hydro One Limited (H) from Jan 03, 2017 through Jan 24, 2022.



Rankings (as of Jan 24, 2022)

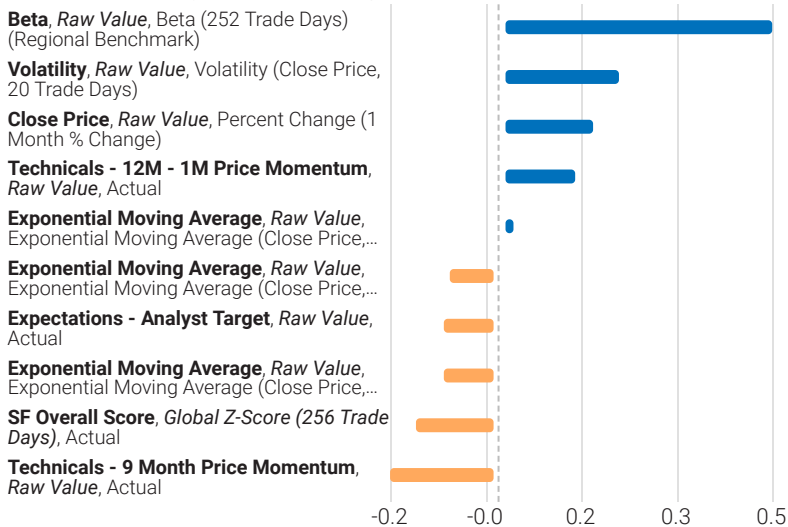
Rank: 2/225 Rank Delta: 1 Star Rating: 5★★★★★ Explain Score: +28.72

Positive Drivers (Explain Score/Data Score) Negative Drivers (Explain Score/Data Score)

+10.89 0%	Beta <i>Raw Value</i> , Beta (252 Trade Days) (Regional Benchmark)	-0.48 97%	Value - Dividends to Cash Flow <i>Raw Value</i> , Actual
+4.63 5%	SF Overall Score <i>Global Z-Score</i> (256 Trade Days), Actual	-0.47 66%	Expectations - Forward Free Cash Flow to Price Ratio <i>Raw Value</i> , Actual
+4.35 2%	Volatility <i>Raw Value</i> , Volatility (Close Price, 252 Trade Days)	-0.4 37%	Quality - Capital Efficiency <i>Raw Value</i> , Actual
+4.15 5%	Volatility <i>Raw Value</i> , Volatility (Close Price, 20 Trade Days)	-0.37 6%	Expectations - Analyst Target <i>Raw Value</i> , Actual
+1 48%	Technicals - 12M - 1M Price Momentum <i>Raw Value</i> , Actual	-0.22 50%	Value - Return on Equity <i>Raw Value</i> , Actual

Explain Score Deltas

Variables with the largest movement in explain score from Jan 17, 2022 to Jan 24, 2022.



Factor Timing

Momentum	Value	Volatility	Size	Trade Act.	Profitability	Leverage	IS*	Growth	Earnings Variability	Dividend Yield Actual	Dividend Yield	CF*	BS*	E/S/G
Q3	Q4	Q5	Q1	Q2	Q3	Q2	Q3	Q4	Q5	Q1	Q2	Q4	Q4	Q1/Q2/Q3

*IS/CF/BS stand for Income Statement/Cash Flow/Balance Sheet respectively.

For more information on these rankings, please visit: <https://insights.boosted.ai/models/ad8d3500-219f-4fd6-8b30-dbc0d928de9/b92ad02c-5704-499f-8c25-f3aa84f478cc/rankings>