Backtesting ESG Factor Investing Strategies

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Abstract

This paper takes an in-depth look at socially responsible investing and problems associated with it. One of the main problems with ESG factor investing is caused by data. Firstly, we obtained unfiltered ESG data from OWL Analytics. Secondly, we reviewed two strategies based on ESG Factor investing: ESG Factor Momentum Strategy and ESG Level Factor Strategy. After we tested both of these strategies on our data, we concluded factor strategies based on ESG scoring seem to be profitable during the last several years. Our findings confirm the broader trend of recent outperformance of strategies based on ESG. Unexpectedly ESG level had better performance than the ESG momentum. Performance of the momentum was positive, although low; compared to the notable performance of ESG level. ESG scoring seems to be applicable to use in the portfolio as an addition to other better-known factors. Nonetheless, we still recommend caution because of the inconsistency of the ESG data among data providers.

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Socially Responsible Investing (also called ESG Factor Investing) grows in popularity. More and more investors enter the stock market not just to invest their savings, but they also want to support companies that bring positive social or environmental change. ESG factor investing can bring satisfaction to those investors. But does it also bring a real outperformance in a financial sense? Is there some ESG factor alpha? How big is it? These are some of the questions we have decided to investigate – we obtained data, identified ESG factor strategies and tested them. Feel free to explore them with us…

Introduction to ESG

A reader who knows what the ESG investing is can skip this part and go directly to backtesting, as we will shortly explore few ESG basics in the next few paragraphs.

How can we measure if any company is responsible to the environment and overall society? Simply, by grading it – the ESG score measures the firm's quality in three categories: environmental, social and governance. Each category is affected by different things. The environmental score takes into account carbon emissions, low resource consumption, pollution, innovations aiming to improve environmental protection and much more. Social score focuses on human rights, business ethics, safety standards for workers, cash donations, protection of public health and so on. Factors that affect the governance score can be rights of shareholders or the company's financial and non-financial goals.

The question of why would someone use ESG score as an indicator has multiple answers. Firstly, there might be a non-financial motivation, for example, a religious belief. Certain religions may want to exclude sectors like the gambling, alcohol or armament industry from their portfolio. Secondly, the philanthropic point of view that seeks green, socially responsible investments is gaining popularity in recent years. High ESG score is seen as appealing for those investors. And lastly, high ESG score can signal forward-thinking and efficient company, and those attributes can signal better financial performance.

Of course, there are a lot of research papers which are focused on the applicable ESG investing strategies; they examine if using ESG score enhances, harms or has no effect on the performance. If researchers confirmed the performance-enhancement, it would mean that ESG scores could be utilized as factors, and used in practice. Also, if there was no correlation between ESG score and performance, an investor, who seeks sustainable investing could be interested in it (as his performance would not be penalized). On the other hand, the focus on the ESG scores could lead to investing in unprofitable companies or reduce an investment universe in a way that wouldn't be diversified.

The separate problem with ESG score is that it's hard to measure it objectively. There are multiple data providers with huge databases, but each provider can value different elements of

a company on an individual scale. Also, data providers can weight the three scores differently. The result is that the score of one company can widely vary between data providers.

Related literature

In a paper written by Fulton, Kahn and Sharples: Sustainable Investing: Establishing Long-Term Value and Performance [5], researchers have found that firms with high ESG ranking can better finance their activities since they have a lower cost per capital. Stocks of these firms have a much lower risk than others. This paper also states that "88% of studies of actual SRI fund returns show neutral or mixed results "and "we have found that SRI fund managers have struggled to capture outperformance in the broad SRI category, but they have, at least, not lost money in the attempt. "

Another research examined the relationship between ESG and performance in the years 2010 – 2017. According to Bennani, Le Guenedal, Lepetit, Ly, Mortier, Roncalli and Sekine: How ESG Investing Has Impacted the Asset Pricing in the Equity Market [1], ESG investing has become profitable since 2014. During 2010 and 2013, the article did not find any indication of the profitability of ESG integration. According to the study, ESG scores in stock picking strategies would have led to neutral or negative results. It is different in the following part of the study. In more recent years, there is a notable change, as most indicators turned positive between 2014 and 2017.

Other pieces of researche such as Huppé: Alpha's Tale: The Economic Value of CSR [8] suggest that corporate social investing alpha arose because investors have continuously undervalued information about social responsibility. Despite, omitting such relevant information it leads to a surprise of the performance of the corporate social responsibility leaders and the re-evaluation of their choices. Research by Clark, Feiner and Viehs: From the Stockholder to the Stakeholder: How Sustainability Can Drive Financial Outperformance [3] studied over 200 sources and found a correlation between sustainable industries and economic performance. In the paper, 88% of reviewed sources declare that sustainable practices are applied to better cashflows, where the mechanism is simply a better operational performance.

Secondly, there is still a problem with the various data sources for the ESG scores. Research by Berg, Kölbel and Rigobon: Aggregate Confusion: The Divergence of ESG Ratings [2] analyzed data from five different rating agencies (KLD, Sustainalytics, Vigeo-Eiris, Asset4, and RobecoSAM). The paper has found out that the average correlation between scores is 0.61 and that this value ranges from 0.42 to 0.73. This makes it difficult or even impossible to price ESG scores in the market correctly. Besides, it is hard for companies to improve their perception and sustainability, since according to one ESG score, the company could be one of the better firms, while the other ESG score can register something very different. This results in the fact that any study on the relationship of the scores and performance is impacted by the choice of the data provider.

Probably the easiest way to incorporate ESG scores into trading portfolios is by doing the negative screening. In the paper by Verheyden, Eccles and Feiner: ESG for All? The Impact of ESG Screening on Return, Risk and Diversification [13], authors tested the exclusion of worst-performing ESG stocks or filtering the investment universe. This paper analyzes either "Global All" universe or "Global Developed Markets". The first consists of large and mid-cap stocks in 23 developed and 23 emerging markets and the second one consists of large and mid-cap stocks of developed markets. This paper partly addresses the hypothesis of whether the exclusion of stocks would decrease the profitability of the strategy. The strategies are not less profitable than benchmarks; in fact, the performance is better. Therefore, one could conclude that the exclusion of the worst ESG performers leads to superior performance. This could be characterized as doing well by doing good. The simple strategy was to exclude either bottom 10% or 25% of stocks, sorted by overall ESG scores. The benchmark is either Global All or Global Developed Markets.

Another possibility is not to lose the lowest ESG stocks from the investment universe, but to tilt towards better-rated stocks. The study conducted by Nagy, Kassam and Lee: Can ESG Add Alpha? An Analysis of ESG Tilt and Momentum Strategies [9] examined such strategy, using the stocks of the MSCI World index during 2007-2015. ESG ratings were obtained from the MSCI (IVA scores). The strategy was profitable, but the performance was only 1.06%.

A somewhat different approach is applied in the paper by Dorfleitner, Utz and Wimmer: Where and When Does It Pay to Be Good? A Global Long-Term Analysis of ESG Investing [4], a source paper of [ESG Factor Investing Strategy in the Quantpedia's screener](https://). This paper uses data from the Asset4 and stocks that are scored by this firm in the various regions (North America, Europe, Japan and the Asia Pacific). The period used in this paper is from 2002 til 2011. We also used this strategy, and its detailed description is in the latter part of this paper. The most promising results from this paper are for the North America and Europe region, which is not a surprise as the ESG investing is most common in these parts of the world. The theory expects that in the short term, firms with high ESG scores would have abnormal returns of zero, but in the long run, theory expects positive abnormal returns. On the other hand, firms with low ESG scores are expected to have negative abnormal returns. Additionally, outcomes indicate that financial markets are inefficient in terms of ESG scores and are not capable of sufficiently pricing different levels of corporate social performance in the short run and particularly in the long run.

Paper presented by Nagy, Kassam and Lee: Can ESG Add Alpha? An Analysis of ESG Tilt and Momentum Strategies [9] has also tested a momentum strategy. Authors propose that a firm which has improved the ESG the most is expected to outperform. Although the advantages of a better-rated ESG portfolio are anticipated to be evident only in the long term, according to the paper, the market could likely react to a change in rating in a relatively short period. Given the rise of ESG investing, we may see a reduction in the response period. Therefore, the strategy is to overweight, relative to the MSCI World Index, companies that increased their ESG ratings most during the recent past and underweight those with decreased ESG ratings. Lastly, the strategy is profitable, but the profit is low similarly to our conclusions.

Backtesting setup

Does ESG scoring add any incremental information? Can we build equity factor strategies based on it? We decided to test it for ourselves.

We went to look for the ESG data provider and obtained an unfiltered ESG data from OWL Analytics.

The data set we worked with contained monthly data from March 2009 to October 2019; for each month, we had from 5000 (at the beginning of the sample) up to almost 30 000 companies to work with. For each company, we got its ISIN, shareClassFIGI, region, and over 200 detailed parameters for the E, S, and G score and of course, the total ESG score.

Because we wanted to focus on the U.S. market, we filtered companies from that region, and through their ISIN, we paired them with their ticker and price for each month. Then we deleted small firms and those to which we did not get the ticker or price from our data set. In the end, we were left with around 700 companies.

Both strategies were backtested using QuantConnect framework.

ESG Factor Momentum Strategy

The first strategy we decided to test was the ESG Factor Momentum Strategy. This strategy is based on overweighting companies, whose ESG score increased in the recent past and underweighting companies, whose ESG score decreased. The increases and decreases are based on a 12-month ESG momentum, and the strategy is usually rebalanced monthly.

There are multiple methodologies of how factor strategies can be built. We decided to follow the standard approach of building equity long-short factor strategies – sorting into deciles and going long the best and going short the worst decile.

Our implementation of momentum is as follows; we took our finalized data, and we analyzed the percentage shift in ESG scores in the last twelve months. We took into an account the two-month delay in the data. Then we divided the scores into deciles; we go long on the 10% of the stocks with the greatest ESG momentum and short on the 10% of the stocks with the lowest ESG momentum. The portfolio was value-weighted, so the higher the market capitalization the stock had, the greater weight we gave it. That solved the problem of small stocks having a great impact on the performance of our portfolio. The holding period was three months, unlike the one month that is usual for this strategy. Because of the two-month delay (skip period), we wanted some time for the momentum to manifest; therefore, one month holding period after two-month skip period seemed too short to us, and we picked three months instead. We also implemented tranching – each month, we rebalanced 1/3 of the portfolio, so in three months, the whole portfolio is rebalanced.

This strategy has a compounding average annual return of 0.52% and a maximum drawdown of -4.3%. The Sharpe ratio of this strategy is 0.25.

ESG Level Factor Strategy

The second strategy we tested was the ESG Level Factor Investing Strategy. This strategy, like the ESG Factor Momentum Strategy, is value-weighted but is rebalanced on a yearly basis.

Our implementation of this strategy is as follows: Firstly, we divided the data into quintiles, we went long on the top 20% of the stocks with the greatest aggregate ESG level and short on the 20% of the stocks with the lowest aggregate ESG level. We decided to use the aggregate ESG score for our strategy to keep things simple. But data from OWL Analytics offers more detailed scores for each of the environmental, social and governance scores. Therefore, a more sophisticated strategy built from multiple sub-strategies based on each of the E, S and G sub-scores can be probably built.

We decided to hold stocks for 12 months. The reason for this is that ESG level is similar to value or other fundamental factors, which take longer to manifest the information to the price, unlike the ESG momentum which is closely related to other momentum-based factors. Because of the long holding period, we had to divide the portfolio into twelve parts, and each month we rebalanced 1/12 of the portfolio, so the entire portfolio was rebalanced in one year.

This strategy has a compounding annual average return of 2.2% and a maximum drawdown of -3.5%. The Sharpe ratio of this strategy is 0.84.

Conclusion

After we tested both of these strategies on our data, we can conclude that factor strategies based on ESG scoring seem profitable during the last several years. Our findings confirm the broader trend of recent outperformance of strategies based on ESG.

What surprised us is that the ESG level had better performance than the ESG momentum. Performance of the momentum was positive, although low even after the ten year period. However, ESG level performed unexpectedly well. ESG scoring seems to be applicable to use in the portfolio as an addition to other better-known factors (like value, momentum, low - volatility, etc.); however, we still recommend caution. Because of the fact that the ESG data are not consistent among data providers, the reproduction of a certain approach may lead to different results if the same dataset is not used. A possible solution is to work with as many ESG datasets as possible. But we hope that we have presented the glimpse into the possible application of ESG scores from the quantitative point of view. Either for profit-enhancing properties or producing more socially responsible strategies.

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