



PanAgora



Quantitative ESG Investing

Mike Chen, Ph.D., George Mussalli, CFA, PanAgora Asset Management, Inc.
Mehrzaad Mahdavi, FDP Institute

April 2020



What is ESG Investing?

The acronym ESG stands for “Environmental, Socials, and Governance”. Many terms are used interchangeably when it comes to ESG investing, including “Sustainable”, “SRI (socially responsible investing)”, “Impact”, etc. Regardless of the name used, broadly speaking this style of investing focus on metrics other than those found in traditional financial data sources such as market data, financials statements (e.g., balance sheet, income statements), etc. Metrics and issues considered in ESG investing includes:

- **Environmental:** Carbon emission, water usage, climate change, etc.
- **Social:** Employee morale, corporate value, customer sentiment towards the company, etc.
- **Governance:** Board quality, executive compensation structure, accounting practices, etc.

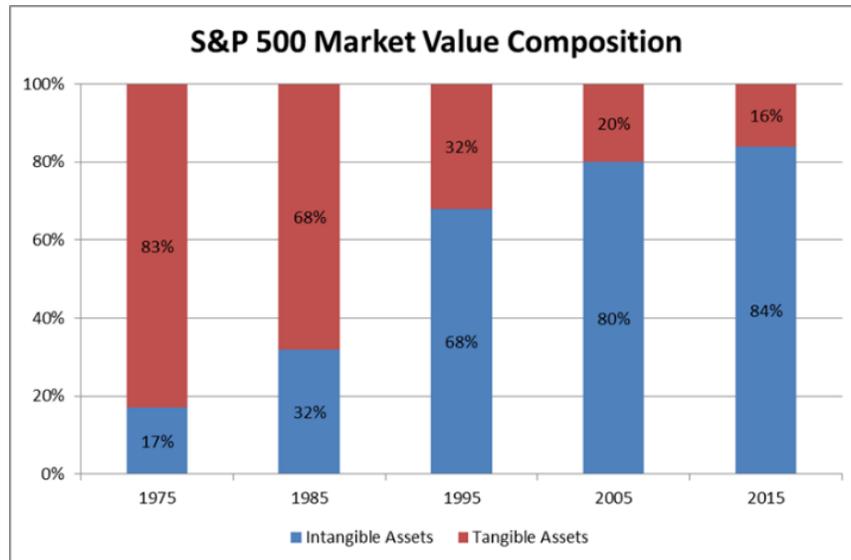
Depending on the investment objective, there are two broad categories of ESG investing, “Integration” and “Impact”:

- **Integration:** The objective ESG integration investing is the same as traditional investing. That is, maximizing return per unit of risk taken.
- **Impact:** For impacting investing, in addition to financial return, the investor also wants to achieve certain non-financially oriented outcome.

For ESG integration investing, ESG data and metrics are considered to judge companies from a financial perspective. For ESG impact investing, investor’s values based goals are also incorporated into the investment objective. These goals are varied, and can include promoting gender equality, accelerate climate change solutions, etc. Since there are many possible values based goals, the challenge of ESG impact investing for asset managers is how to create a framework so that the strategy offered can be tailored to the asset owner’s values.

Why ESG Investing, and Do You Give up Alpha When Investing for ESG?

The reason for ESG investing is simple. Think of the modern, knowledge-based, economy. The largest corporations by market cap these days are those in the IT and Financials Services sectors, where the companies have very little tangible asset. Rather, a large part of market cap of these companies resides in the brand, the IPs they hold, the quality of their employees and their innovativeness, etc. That is, in the so-called “intangibles”. The trend of intangibles becoming an ever larger part of corporate valuation has been occurring for the past 40 years.



A common first question people often ask about ESG investing is, “Do you give up alpha when investing for ESG?” Our answer to this question is, “No, not if you do it right.” In fact, since intangible assets comprise of the majority of corporate valuation these days, and since ESG considerations is a method to examine many of the intangibles affecting corporate valuation, not considering ESG issues could cause investors to leave alpha on the table!

How to do ESG Investing

When it comes to ESG investment, we believe there are several issues an investor must consider:

- Which ESG issues should you consider?
- If you examine ESG issues with an eye to generate alpha, what is the “materiality” of your ESG metrics?
- If you want to invest for impact in addition to financial returns, how do you optimally integrate both financial and non-financial objectives into your portfolio construction?

The first issue is mainly a matter of what’s important to the asset owner. If the asset owner is sustainability minded, and cares about gender equality, then her portfolio should own a relatively higher portion of companies that have relatively higher representation of females at all levels of the company. On the other hand, if the asset owner cares about carbon emission, then the portfolio companies should emit less carbon in aggregate than some pre-specified target or the reference benchmark.

For the second issue, from our experience we’ve found that ESG consideration can certainly lead to alpha generation as well, as long as the ESG considerations are material to the company business and operation. What we mean by materiality of an ESG issue then is, if the company scores well on that issue, it should have positive impact on its business, and vice versa. For example, in many asset light

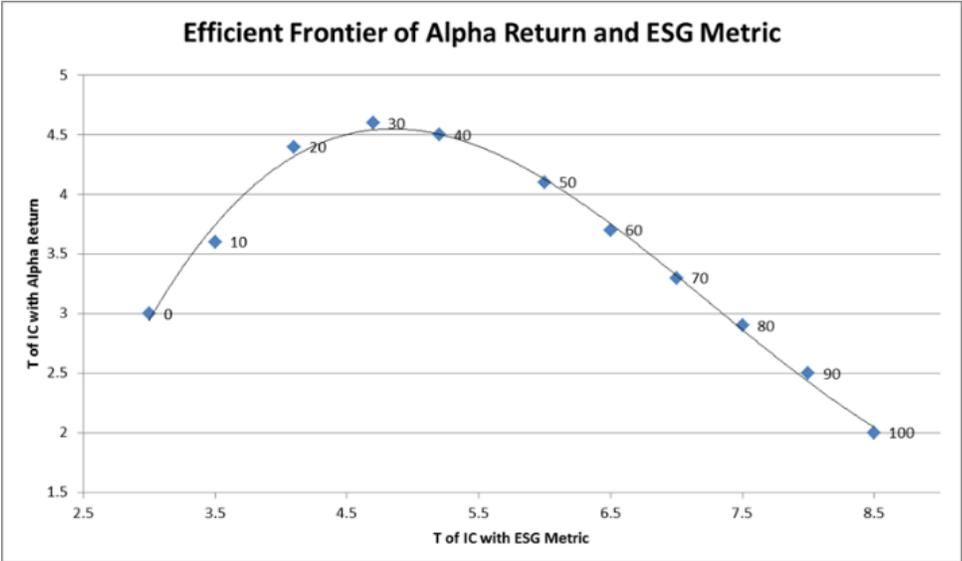
industries, human capital is one of the most valuable resource the company possess. For those companies then, if employees are motivated and aligns with the company’s mission, then those companies should outperform over the intermediate horizon compared to companies where majority of employees are disgruntled.

Finally, when investing for ESG impact, both financial objectives and non-financial objectives are important to the asset owner. Traditional financial portfolio construction optimizes return for a given level of risk, but for ESG impact investing, both objectives needs to be incorporated into the portfolio construction process, and any tradeoff, if any, needs to be clearly understood.

Why Quants Have an Edge in ESG Investing

We are firm believers in the quantitative investment process, whether it be the traditional, alpha-oriented investing, or ESG investing where the investment objective can be both financial and non-financial considerations. We believe quants have a distinct edge when it comes to ESG investing, for the following reasons:

- ESG data are non-standardized, and can come in a variety of formats. Quants are adept in working with a variety of data formats. Since many of the ESG dataset can be considered big data, quants are also familiar with using advanced statistical and machine learning techniques to process and transform the underlying dataset in order to extract actionable insights.
- Quants have advantage in coming up with advanced portfolio construction techniques needed to build portfolio that satisfies both financial and non-financial objectives. With such portfolio construction approach, one can optimize the portfolio along the dual dimensions, and quantify any possible tradeoff between financial and non-financial objectives, if necessary, in an “ESG Efficient Frontier”, as shown in the example below.



Some Examples of ESG Alphas Utilizing Alternative Data/Advanced ML Techniques

As discussed above, quantitative style of investing offers an advantage when it comes to ESG investing due to its familiarity of processing alternative data and utilizing advanced ML techniques. Here we give a few examples of ESG alpha factors that utilizes the said approach.

Management ESG Sentiment via Natural Language Processing (NLP): One can learn about corporate management's sentiments and views towards ESG issues by examining their words via NLP. Utilizing proprietary ESG dictionaries, along with recent, neural-network based, NLP technique of embedding, we have found that various ESG-related events affecting a corporation can be classified and scored as positive or negative.

Interestingly, from a return perspective, we have found that when management speaks positively about ESG issues affect the corporation, it does not have too much implication. On the other hand, when management admits shortcomings with regard to ESG-issues, it typically marks the bottom around negative sentiment related to the said ESG issue, and sentiment typically improves afterwards, along with corresponding rise in equity returns, all else equal. This makes sense from a behavioral perspective. Once management admits fault related to an ESG shortcoming, they are on record and have to address and improve the negative situation around the said issue. As issue is addressed, equity return becomes positive.



Corporate benefits: Employees are the engine for a company's innovation and continued progress. When they feel valued and taken care of by the company, they can focus and create value for the company and its shareholders. Alas, as it's an intangible, market do not fully value this effect.

By tracking corporate filings, we have been able to examine benefits, such as retirement plans, medical insurance, paid leaves, etc., provided by the companies to its employees. For example, our research shows that companies who offer superior 401k plans tend to outperform those that provide lesser quality plans or no plan at all.

401k Plan Quality
Long the Top Quality/Short the Worst Quality
January 2010 - December 2017



Challenges and Opportunities for Scale Adoption of AI-based ESG Investing

ESG investing is a new and growing field in quantitative investing. Wide market adoption of ESG investing requires standards and transparent methods. The next generation of ESG quant investing is impacted by key factors including the ones described below.

Alternative data. In order to get reliable ESG integrated portfolio, as we demonstrated in the above section, alternative data should be sourced and deployed along with official reports. Company ESG reports can be limited. Therefore, alternative data sourcing and signals extraction is a differentiating edge for portfolio managers. Another technical challenge is the need for integrating unstructured data and in interfacing with open-data platforms. New NLP methods are gaining interest for ESG portfolio construction. Ability to extract value from unstructured data is requires subject matter expertise in both finance and the specific industry being evaluated.

Granular factors and materiality per industry segment. Industries have different ESG footprint and material factors. Traditionally, financial firms have evaluated companies based the “G” in ESG. Governance factors including fiduciary discipline and organization is well understood. However, the “E” and “S” within the same industry can change depending on the specific company operation. For example, compare video streaming services with traditional media conglomerates. Although these companies are typically classified in the same industry sector in the traditional classification schemes such as GICS, they have vastly different business models and physical footprints, and hence different material “E” and “S” factors. Another example is the energy industry. For the oil and gas upstream, the “E” in the ESG must include material factors such as flaring, produced water, transportation, and

pipeline integrity. While for a midstream oil and gas company, emissions and plant asset integrity are critical factors. It is therefore important to consider more granular material factors to better tune the portfolio with meaningful factors requiring subject matter expertise in operations and workflows of companies within a given industry.

Talent and subject matter expertise. ESG portfolio construction would require a combination of skills within a team. These skills include industry subject matter expertise (evaluating ESG factors), AI/data science talent and finance experience. Shortages of these skills impact widespread use of ESG investment portfolios. Teams with combination of data scientists, finance, and ESG expertise would be most effective in producing personalized portfolios depending on the investor’s requirements. In addition, having “analytics translators”—people who understand AI as well as the business to scope projects, manage the delivery, measure return on investment, and understand how feasible it will be to scale up – is becoming important in high performance teams.

Conclusions

ESG investing is being essential knowledge for the investment community, both from asset owner demand and from alpha generation perspectives. In this brief note, we offer up our perspectives on how it can be approached, and why we believe quants have an advantage when it comes to ESG investing.

Additional References

For further details, please refer to the references given below:

Chen and Mussalli, “An Integrated Approach to Quantitative ESG Investing”, Journal of Portfolio Management, Special Issue on Ethical Investing, vol 46, no 3, Feb 2020.

Chen, Mussalli, and Zweibach, “Decoding Quant ESG”, PanAgora White Paper, Fall 2018.

Important Disclosures

The opinions expressed in this communication represent the current, good faith views of PanAgora as of the date of this communication and are provided for limited purposes. Nothing contained herein should be considered definitive investment advice and should not be relied on as such. The information provided herein has been developed internally and/or obtained from sources believed to be reliable; however, PanAgora does not guarantee the accuracy, adequacy or completeness of such information.

Information presented herein is true as of the date of this communication, and PanAgora assumes no duty to and does not undertake to update any of the information contained herein after such date. In particular, PanAgora’s investment and risk management processes are continually evolving based on its research process and market conditions, and the descriptions of such processes only reflect PanAgora’s process as of the date of this communication. Investment processes are subject to change and portfolio managers may use some or all of the techniques described in this report. There is no guarantee that this investment strategy will work under all market conditions or is suitable for all investors. Each investor should evaluate their ability to invest long-term, especially during periods of downturn in the market.

All PanAgora graphics, logos, page headers, and service names are trademarks, service marks, or trade dress of PanAgora. PanAgora’s trademarks, service marks and trade dress may not be used in connection with any product or service that is not PanAgora’s, in any manner that is likely to cause confusion among customers or investors, or in any manner that disparages or discredits PanAgora.

The Financial Data Professional Institute (FDPI) was established by the CAIA Association to address the growing need in finance for a workforce that has the skills to perform in a digitized world where an increasing number of decisions will be data and analytics-driven. The FDP curriculum introduces candidates to central concepts of machine learning and big data, including ethical and privacy issues, and their roles in various segments of the financial industry to boost and integrate quant knowledge into analytic skills.

Copyright © 2020 PanAgora Asset Management, Inc. All rights reserved.