

Testing for Systematic ESG Fund Construction and Independence Measures

by

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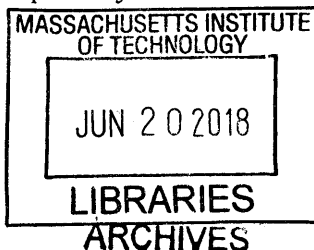
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ABSTRACT

There has been significant research concerning the investment case for Environmental, Social and Governance Funds (ESG), however research into how these funds are constructed has been less studied. The purpose of this study is not to investigate the risk-return case for ESG funds. Instead, this study will focus on the uniqueness of construction, and underlying assets of ESG specific funds. The majority of ESG classified investing is done through fund firms who self willingly vet their existing funds to ESG guidelines. It is more elocutionary, rather than a focused construction methodology. The hypothesis of this study is that funds created specifically for ESG investing are built on this same methodology, and are adapted from an existing fund very similar to the S&P 500.

To test for uniqueness, large cap US equity ESG funds were compared against how many of the underlying assets were shared with the S&P 500. Signals found heavy overlap. However when looking at how the underlying assets are weighted in the fund verse the S&P 500, differences become more pronounced. Interestingly in the aggregate, the portion of the ESG funds dedicated to stocks that are not included in the S&P 500 were not that significant. There are several funds that are constructed with very different underlying assets than the S&P 500 Index, and funds that are very similar.

This study then investigated how much of the underlying assets of each fund differed from the S&P 500 by adjusting the weights of just the underlying assets which it shares with each fund to measure the effect of dilution from the removed "non-ESG" compliant stocks. The resulting increase in overlap was significant for several individual funds, but modest for all funds. Then this study sampled to find if there is more overlap with different common index funds. Interestingly, there was often a higher overlap with the S&P 500 than with a fund's stated benchmark such as the Russell 1000 or Russell 1000 Value Index.

Finally this study looked for correlations between the 3 month, 1 year, 3 year and Morningstar ESG peer performance percentiles. Modest correlations were found slightly favoring funds which were more similar to the S&P 500. Then correlations between each fund's management fee and similarity in the underlying assets were tested. There is evidence that the more unique the fund is, the higher the management fee. However, there

is no evidence of correlation between the fund's management fee and the fund's Morningstar ESG score.

The take away from this study is that some funds are very similar to index funds, like the S&P 500, while other funds have very little in common with standard index funds. There was significant overlap in the underlying assets and the S&P 500, however there was also significant differences in how the underlying assets were weighted. There was not a one to one exchange with a non-ESG compliant underlying asset with another asset with similar characteristic but was ESG compliant.

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1. Introduction

Equity Fund performance has largely been based on two metrics, returns and risk. However increasingly investors, especially family offices, institutional investors and individuals, are choosing funds not on a portfolio efficient frontier. These fund offerings instead, in some way, aligned with the investor's values. For example, the Norwegian Sovereign Wealth Fund (\$1 trillion in assets) and CalPERS (The California Public Employees' Retirement System, \$360 billion in assets) refuse to hold stocks they perceive to be in contrast with their values. These stocks include tobacco, human rights violations (Walmart), destroying the environment (Rio Tinto and McMoRan) and other violations of ethical norms (Potash Corporation of Saskatchewan). The ethical decisions reflect the determined preferences of the population who the fund represents, the Norwegian People and the State of California (Ang 2014). This then implies that there is at least one other metric other than risk and reward which investors evaluate equities.

Funds that cater to these types of values-based systematic sustainable or socially conscience decision making, are commonly known as Environmental, Social and Governance Funds, or ESG Funds. There has been over 2000 research papers published questioning the competitiveness of these types funds vs a market benchmark fund, yet the investment case for these funds remain (Friede, Busch and Bassen 2015).

Also despite the research history, many fund managers remain unsure of how ESG funds should fit into their portfolios because of the often-reduced returns without reduced risk. Their dilemma is that clients are increasingly interested in ESG funds because they perceive the funds advance their values. Meanwhile fund managers remain responsible and accountable to balance portfolio performance. Furthermore, despite the large amount of inconclusive research investigating ESG returns verse a benchmark, ESG investors are, so far, willing to ride out periods of underperformance and higher management fees (Bernow 2017). Further, increasing the challenge for fund managers, approximately 100 ESG funds are less than three years old, with limited historical data and less than \$50 million in AUM making historic testing difficult (Morningstar, 2017).

Unknown across the fund industry is how these funds are constructed. In an effort to understand what type of effect the market might have on these funds, it would be valuable to understand systematically what the underlying assets for ESG funds are. If these funds were to become even more popular, how would they move with the market? What methodology is used to construct these funds, and to that end? What are the primary factors which funds managers are concerned with when building these funds? How are these motivations then put into action with fund construction? How would a fund constructed using ESG performance metrics differ from the most popular funds currently available today?

1.1 Motivation

This study aims to investigate the underlying assets of the largest dedicated ESG funds, and study how are they actually put into application in fund composition. Financial saving products have been measured on easily definable quantitative metrics, primarily on returns. Using standardized risk metrics (Beta) has provided further advanced understanding of financial product metrics. However, what has not been measured symmetrically is how well investments align with the investor's values. What are the underlying assets, and do these investment funds meet the expectations of the investors who would invest in them. This study aims to understand how are ESG funds constructed. Are these funds constructed the way they are because they were adapted from an existing product, or truly constructed from ESG values? Were they constructed the way they were because follow ESG ratings?

Validating the investment case for ESG funds is outside the scope of this study, however validating the business case is within the scope of this study. The interaction between a fund provider and a Financial Advisor, and between a Financial Advisor to an Investor (Retail or Institutional), is that of providing a service and a product. The service, of course is financial advice, and the product is the package of investments the fund provider delivers to the clients. This study also aims to understand client/investor choice. Surveying the largest ESG funds will investigate the makeup and characteristics investors choosing ESG

funds. By selecting funds to research based on the amount of assets under management (AUM) this study should also provide some market analysis. The study will also look at all ESG specific funds, and survey the current variation of offerings, and attempt to understand what makes an ESG fund an attractive investment. Historically funds have been constructed to maximize returns considering risk. If investors are willing to forgo returns for values reasons, then what could some of the possible insights gained from data concerning the return to discretionary choice investors are making subconsciously and deliberately from looking at the available funds.

1.2 Problem Statement and Research Question

ESG Funds are relatively new, and there is considerable debate as to how they fit into a portfolio. There has been over 2000 studies (Friede, Busch and Bassen 2015) on ESG funds. Although there is some evidence from a recent Harvard study (Khan, Serafeim and Yoon 2015) suggests that ESG can be constructed to compete with benchmark funds, this is unproven. Nevertheless, it is generally accepted that investors accept ESG funds understanding their returns could be higher in a different investment fund. This third decision factor in investment vehicle decision making somehow finds a way to match investment choices with their own values.

If investors are choosing to forgo returns because they believe ESG are better aligned with their values, then how should ESG funds be constructed? To maximize a particular ESG characteristic, or to maximize returns while filtering out non-ESG compliant companies? Moreover, are the currently offered ESG funds actually constructed to align with investor values, or are they just existing index funds adjusted to meet the ESG criteria?

This study aims to investigate the construction of ESG funds through investigating the makeup of the dedicated ESG funds' underlying assets and how close they are to standard indices. For many of the largest ESG funds, short term performance tracks closely with the behavior of the S&P 500 raising the question how different are the underlying assets of ESG funds. Based on recent market trends, this study's hypothesis is that most ESG funds are filtered funds, and not truly dedicated ESG funds based on ESG factors.

2. Literature Review

2.1 Survey of available literature on ESG related financial products

In classical finance, shareholders hold corporations accountable only to profit maximization to shareholders, and aside from contractual and legal obligations, have no other responsibility to serve other stakeholders' interests or enhance society's welfare (Friedman, 1970). Yet today firms in various markets from all sectors, including financial services, spend significant amounts of capital on corporate social responsibility (CSR) or ESG related activities. Literature suggests that consumers take into consideration firms' CSR activities when making purchase decisions, noting that and doing so either increases their purchase intention or makes them willing to pay higher prices for the firms' products and services. (Bhardwaj, 2017).

The majority of research in ESG funds is in finding methods to create a competitive investment case. However many of the earlier work on ESG funds arose from research concerning the unmeasured benefits of social responsibility. The terms "Social Capital" and "Corporate Trust" have grown popularity in discussing finance and economics since the early 1990's (Putnam (1993), Knack and Keefer (1997), La Porta et al. (1997), Guiso, Sapienza and Zingales (2004). The researchers each make a business case for social responsibility in capital allocation, citing the capital value of social capital. Yet the social capital remained nonnumeric. Additionally proponents of social capital argue that through 'responsible investment' companies and governments can build social goodwill and public trust, benefiting the organization.

More recently (Lins et al, 2017) argues corporate social responsibility adds corporate value, especially during market shocks. During the financial crisis, firms with high social capital, as measured by corporate responsibility scores (CSR), had stock returns 4-7 percent higher than firms with low CSR scores. Lins also argues that high CSR firms experienced higher profitability, growth, and sales per employee relative to low scoring CSR firms. This would suggest that that the trust between the company and the shareholders and investors does hold a value premium. Positive CSR scores have further been linked to healthy investing environments. In a study of over 23,000 companies

globally, a strong correlation was found between firms with high CSR scores, and positive investment and legal environment of the firm's origin (Liang 2017).

However, despite these studies and strategic benefits, as of 2018, the empirical findings regarding the impact of CSR on firms' financials are mixed (Wang, Sarkis 2017). (Revelli and Viviani, 2011) found conflicting research citing three studies arguing that social responsible investing can generate financial returns higher than conventional funds or indices and at no additional financial cost (Mallin et al., 1995; D'Antonio et al., 1997; Statman, 2000; Plantinga and Scholtens, 2001; Galema et al., 2008). Conversely they also found other studies that show a negative impact, stating social responsible funds are destructive of value and gives performance inferior to those of conventional investments (Havemann and Webster, 1999; Burlacu et al., 2004; Miglietta, 2005; Girard et al., 2007; Jones et al., 2008). Finally, a third opinion still found neutral or not statistically significant impact of sustainable investing on performance (Hamilton et al., 1993; Dhrymes, 1998; Kreander et al., 2005; Benson et al., 2006; Bauer et al., 2007; Fernandez-Izquierdo and Matallin-Saez, 2008). Further complicating the case, analysis has shown that there are correspondingly optimal periods to invest in CSR, calling into question the robustness of the practice over all time horizons (Bhardwaj et al, 2018).

Lastly, a new study by (Khan et al, 2015) finds new evidence of the investment merit of sustainable investing. Their finding take both calendar-time portfolio stock return regressions and firm-level panel regressions, and found that firms with good ratings on material sustainability issues significantly outperform firms with poor ratings on these issues. (Khan et al, 2015) also claims that firms with good ratings on immaterial sustainability issues do not significantly outperform firms with poor ratings on the same issues.

2.2 Construction of ESG Funds

With mixed investment performance results, many researchers and fund providers are suggesting that ESG funds are valuable, despite subpar performance, because investors as consumers and are asking for them. (Tse and Wilson, 1988) reported 30 years ago the

measured high satisfaction of ESG investing as a product. They argue that customers/investors will demand and will purchase ESG funds despite lower returns. More recently, as of 2017, society is increasingly demanding sustainable and social business practices. These demands are increasingly making ESG consideration necessary in the current competitive climate. Another recent study found social responsibility impacts corporate reputation, brand image and ultimately financial value (Lopez-Perez et al, 2017).

For actual fund construction (Capelle-Blancard and Monjon, 2011) found several interesting points. They first independently researched and concluded that ESG/SRI mutual funds do not outperform the market, whatever the performance measure considered. However, if ESG screening is considered as a cost to provide a desired product, evidence finds that a greater screening intensity slightly reduces financial performance, but a tougher screening improves financial performance. This finding suggests the need for better screening processes for better financial performance, not more screening which incurs more cost. Also better information on the quality during the selection process associates with better financial performance.

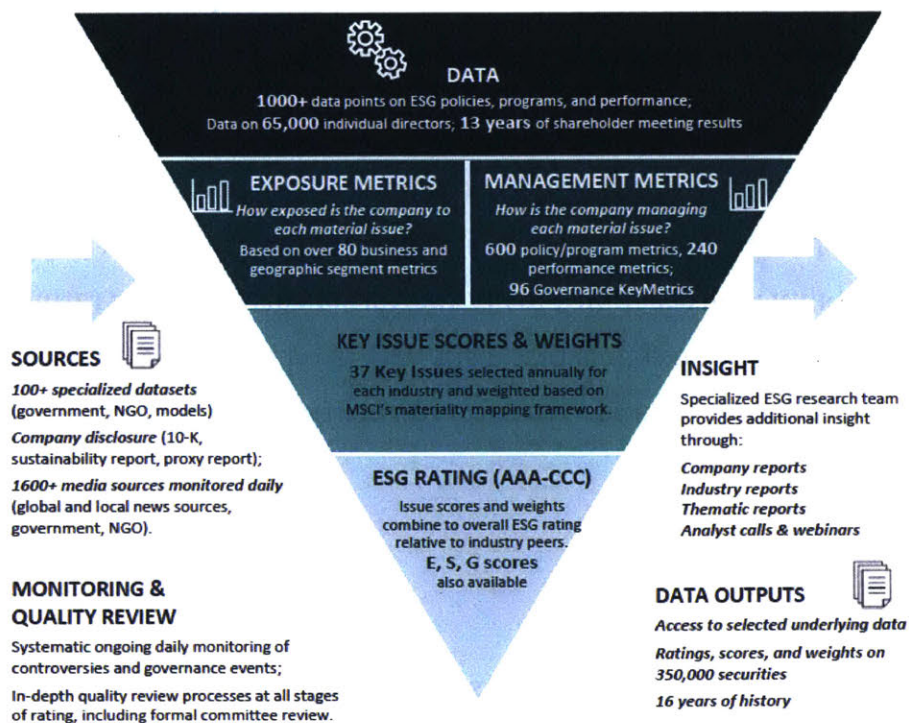


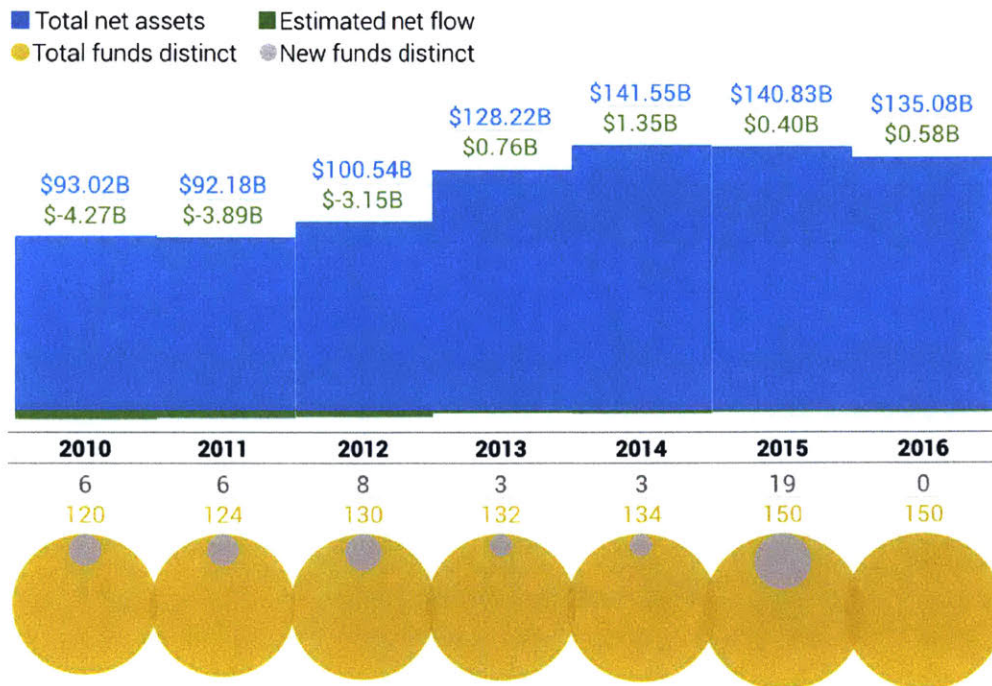
Figure 2-1 MSCI ESG Rating Process

Another component actively researched is for the improvement of ESG performance indicators. A leading ESG rating provider, MSCI's ESG rating framework and process is above. These indicators are subjective, and also not universally vetted. The lack of universal acceptance further complicates policymaking. MSCI's key indicators can be found in Appendix 1. Research suggest that firms' long-term sustainability can be better valued and better decision-making with environmental indicators (Kocmanova, 2012). Through better metrics and rating, investors would be able to engage in active ownership into investor's portfolios, reducing risk, and increasing values-based transparency (Clarke et al, 2015).

3. Data Analysis

3.1 What do the construction of ESG funds look like.

As of 2017, large amounts of capital invested in US equities is disbursed into funds with varying degrees of ESG compliance. Scott Mather of PIMCO, the 10th largest investor of ESG funds as of 2017, states of his firm’s adapting policy toward ESG funds: “For many investors, it is no longer sufficient to simply screen out undesirable investment categories; they seek to proactively affect change.” Approximately \$22.89 trillion, one-quarter of all assets managed worldwide, is invested according to environmental, social and governance principles, compared with 21.5 percent in 2012 (Bernow et al, 2017). The vast majority of ESG investing however is through self-compliant and enforced ESG polices in fund management. These are funds built on an economic principle, such as Value or Low Volatility, to balance return and risk, and adapted to be ESG compliant (Bhardwaj et al, 2018).



Source: Morningstar, Inc.

Figure 3-1 ESG-focused US Mutual Funds
(Taken from Morningstar Research)

ESG funds have grown, as seen from the Morningstar provided above, but not rapidly. Yet nearly all large firms now have departments that advise on how to make firms ESG compliant. In addition, many firms now also offer an ESG fund whose form and function is constructed with a designed ESG architecture, systematically incorporating ESG values, investor-consumer desires, and risk and return. There appears to be varying degrees of how much ESG value is emphasized. Some ESG funds claim to only invest in assets that promote specific Environmental, Social or Governance factors, such as the Calvert Global Water fund (CFWAX), or the Pax Global Women's Index Fund (PXWEX). As of 2018, these funds are smaller, typically less than \$1 billion in assets.

Of the ESG specific funds, the vast majority of the U.S. based equities are in managed mutual funds split between equities, corporate bonds, and municipal bonds. As of 2017, ETFs (Electronically Traded Funds) only have \$4.8 billion in assets under management, representing only .02% of U.S. ESG dedicated funds (Bernow 2017). Due to the relatively small amount of capital invested in ESG ETFs, this study only focused on ESG US Equity Mutual funds. The same methodology used in this study could be applied to ESG ETFs.

Some firms specialize in offering funds only in ESG investing. These firms include but not limited to Calvert, Boston Common Asset Management, Domini Impact Investments, New Alternatives, Parnassus, PAX, Glenmede and Guidestone. The majority of the firms offering specialized ESG funds however are large incumbent asset managers who offer a wide range of investment vehicles.

For this study, data was taken from FactSet Financial Data Services, and checked for data gaps filled in with data from a Bloomberg Financial Terminal.¹ Initial data research also taken data from Wharton Research Data Services and Bloomberg Financial Data Services. This study found approximately 207 ESG specific funds (as of March 2018), divided among a mix of large cap US equity, small-medium cap US equity, international global equity, specialty equity (i.e. catholic, or women leadership focused funds), corporate bonds and municipal bonds. International ESG funds tend to be the oldest. Funds constructed with US

¹ Both licenses to access the financial data was through MIT's Academic license. The data was accessed, pulled and confirmed during the period of December 2017 – April 2018.

Equities tended to have the largest AUM. The 18 largest of all funds in AUM (fixed income, Int'l and US equity) are constructed with US equities. This study found that of the top 40 largest US ESG equity funds, nearly all funds did not target on any particular sector, but did underweight the energy and utilities sectors, eliminating non-ESG compliant equities. The notable exception is the TIAA-CREF Social Choice Low Carbon Equity Fund (TLWCX).

Of note, within the time-period of this study, data has seen considerable volatility due to changing market conditions, and outside political pressure. Price volatility has increased in the first quarter of 2018, which has had an effect on the weightings of the underlying assets of the funds and the indices, however not significant enough to cause great change in the outcomes of this study. More interestingly, political pressure has changed weightings of some funds due to recent 2018 national political agendas.

To control for market volatility and fund rebalancing, fund weighting data and fund/index membership was pulled over a two-day period when the US Equity markets were closed. In order to ensure uniformity in the data, all data for fund composition, and weightings is from FactSet Financial Research Databases. The majority of the other data was taken within a two-week period, however axillary data (i.e. fund AUM, etc), and all other data was pulled within a 4 month window during this study's data collection period.

3.2 ESG Fund Analysis

Although this study searched for all ESG funds, (yielding 207 funds), there is a high potential of other ESG funds not listed, or not ESG-classified in Bloomberg and FactSet. However this study believes that the overwhelming majority of the AUM invested in dedicated ESG funds are reflected in the data set, and the potential missing data would be from very small funds. The focus was on ESG funds was on large cap funds. The concern with using small equity funds is the reliability of the data, and the limited availability to comparable funds to benchmark, especially the potential for small emerging energy-type tech firms with illiquid stocks, would skew results. This study also eliminated all funds that had mixed fixed income and equities as their underlying assets.

After filtering for US Large Cap Equities, of the 207 ESG funds, 40 ESG funds remained. The type of fund provider, AUM, age and performance varied drastically. The AUM is heavily concentrated with the largest funds; 80% of the total AUM is concentrated in just the top 10 funds, and nearly one third of AUM is the Parnassus Core Equity fund. Parnassus is a firm that specializes in ESG funds. The graphic below depicts the disparity in AUM.

Percent AUM Invested in Largest ESG Equity Funds

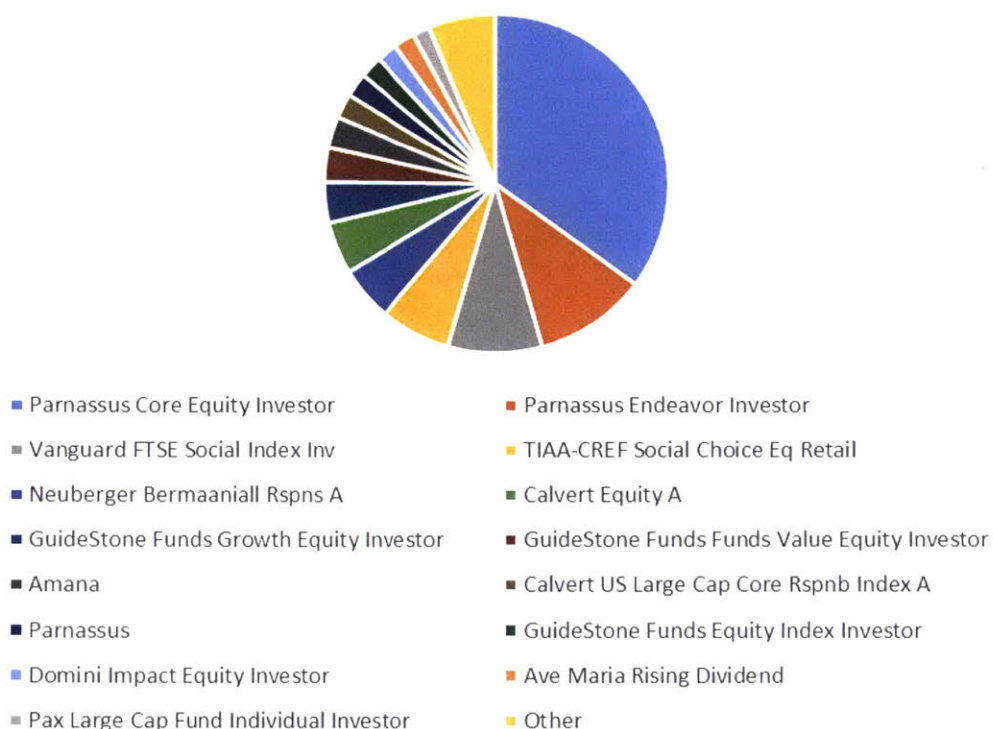


Figure 3-2 AUM in US ESG Equity Mutual Funds

In addition, many funds are divided into several investor classes. For the purposes of this study, only one investor class with the same AUM was used. The remaining repeated funds with differing investment classes were eliminated from the study sample. For example, the Domini Social Equity Fund offers both an “Institutional” and an “Investor” class of fund on the same pool of assets. Only one of these fund classes was used.

Especially within a year time interval of when the data was pulled, a majority of the 40 largest ESG fund performed very similarly to the S&P 500 US Equity Index. For example, below is BlackRock’s Impact Equity Fund and an S&P 500 benchmark.

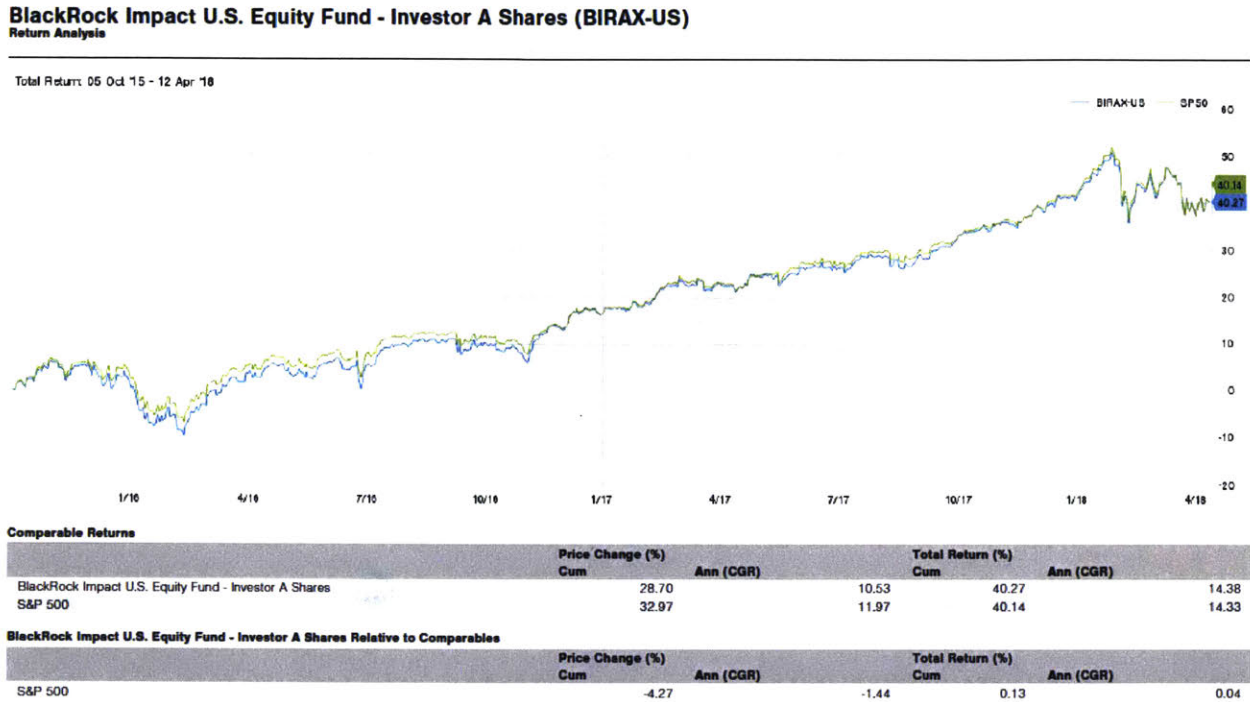


Figure 3-3 Fact Set Return Analysis of BlackRock Impact Equity Fund

If most of the U.S. equity funds are highly correlated with common equity indices, this would imply that the construction of these funds are not constructed prioritizing the ESG rating of the underlying assets but are adapted from an existing, yet less risky common equity index. This follows with the policy of many fund providers who do not offer ESG funds. These fund providers use the industry standard of “negative screening” to eliminate non-ESG compliment assets, while maintaining broad sector exposure and sector neutrality.

In further digging into some of the largest funds, there also appears to be few underlying assets removed. Although there was a higher concentration of equities from certain sectors removed. For example, in Vanguard’s ESG fund, the Industrials sector is in nearly not represented in the fund compared with the S&P 500 benchmark. Meanwhile, the fund is over-weighted in the Information Technology sector.

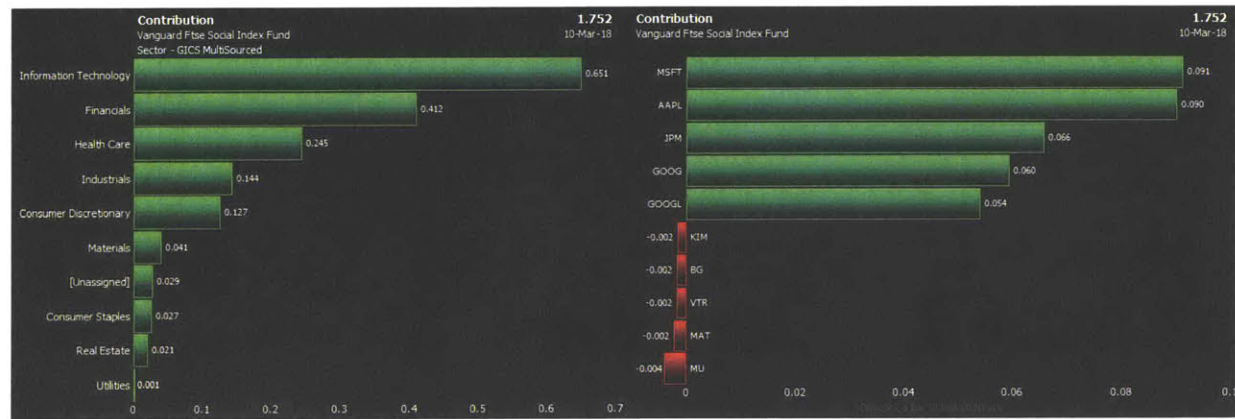


Figure 3-4 Bloomberg Vanguard Social Index Fund

3.3 Measured differences between the ESG Funds and the Index funds

This study used several metrics to test the construction of ESG specific funds to a S&P 500 index. The following will describe in detail the methodology and logic behind the metrics. A sample of all the metrics for an individual fund can be found in Appendix 1.

The first test used to evaluate how many underlying stocks were in both each ESG fund, and the S&P 500 Index. Below is a Table of the 40 largest ESG Large Cap equity dedicated funds with the number of underlying equities and how many of those equities are also in the S&P 500 Index. Collectively, on average 72% of the fund underlying assets are also in the S&P 500. Interestingly, several funds have all of their underlying assets within the S&P 500. The Stewart Large Cap Enhanced Index shares all of its 476 underlying stocks with the S&P 500. The results are in table 3-1 below:

Table 3-1 US Equity Large Cap ESG Mutual Funds

Fund	Ticker	Number of Stocks	Number of Stocks in S&P 500 Index
1 Parnassus Core Equity Investor	PRBLX	36	28
2 Parnassus Endeavor Investor	PARWX	33	29
3 Vanguard FTSE Social Index Inv	VFTSX	456	366
4 TIAA-CREF Social Choice Eq Retail	TICRX	583	254
5 Neuberger Bermaaniall Rspns A	NRAAX	38	30
6 Calvert Equity A	CSIEX	48	41
7 GuideStone Funds Growth Equity Investor	GGEZX	102	76
8 GuideStone Funds Funds Value Equity Investor	GVEZX	270	185
9 Amana	AMANX	40	31
10 Calvert US Large Cap Core Rspnb Index A	CSXAX	744	337
11 Parnassus	PARNX	40	28
12 GuideStone Funds Equity Index Investor	GEQZX	494	488
13 Domini Impact Equity Investor	DSEFX	137	94
14 Ave Maria Rising Dividend	AVEDX	42	31
15 Pax Large Cap Fund Individual Investor	PAXLX	42	42
16 Brown Advisory Sustainable Growth Adv	BAWAX	37	28
17 StewardLarge Cap Enhanced Index Indv	SEEKX	476	474
18 Dreyfus Sustainable US Equity A	DTCAX	39	30
19 Green Century Equity	GCEQX	361	227
20 American Century Sustainable Equity	AFDIX	96	89
21 Walden Equity	WSEFX	74	55
22 Calvert US Large Cvalue Rspnb Idx A	CFJAX	522	261
23 Touchstone Premium Yield Equity A	TPYAX	47	527
24 Miller/Howard Income-Equity Advisor	MHIDX	46	28
25 TIAA-CREF Social Choice LwCrbn Eq Retl	TLWCX	584	222
26 Gabelli ESG AAA	SRIGX	58	24
27 Calvert US Large Cap Growth Rspnb Idx A	CGJAX	522	225
28 Ariel Focus Investor	ARFFX	31	21
29 BlackRock Impact US Equity Investre A	BIRAX	361	181
30 Jhancock ESG Large Cap Core A	JHJAX	78	508
31 American Trust Allegiance	ATAFX	42	25
32 TCW New America Premier Equities N	TGUNX	29	21
33 Jhancock ESG All Cap Core A	JHKAX	81	63
34 AIG ESG Dividend A	EDFAX	41	29
35 JPMorgan Intrepid Sustainable Equity A	JICAX	71	67
36 Epiphany FFV A	EPVNX	57	57
37 Monteaagle Select Value I	MVEIX	28	26
38 Glenmede Responsible ESG US Equity	RESGX	100	82
39 Baywood Socially Responsible Invs	BVSNX	46	32
40 ClearBridge Sustainability Leader FI	LCSTX	45	30

The chart below bar chart assets within each fund that is also in the S&P500 index.

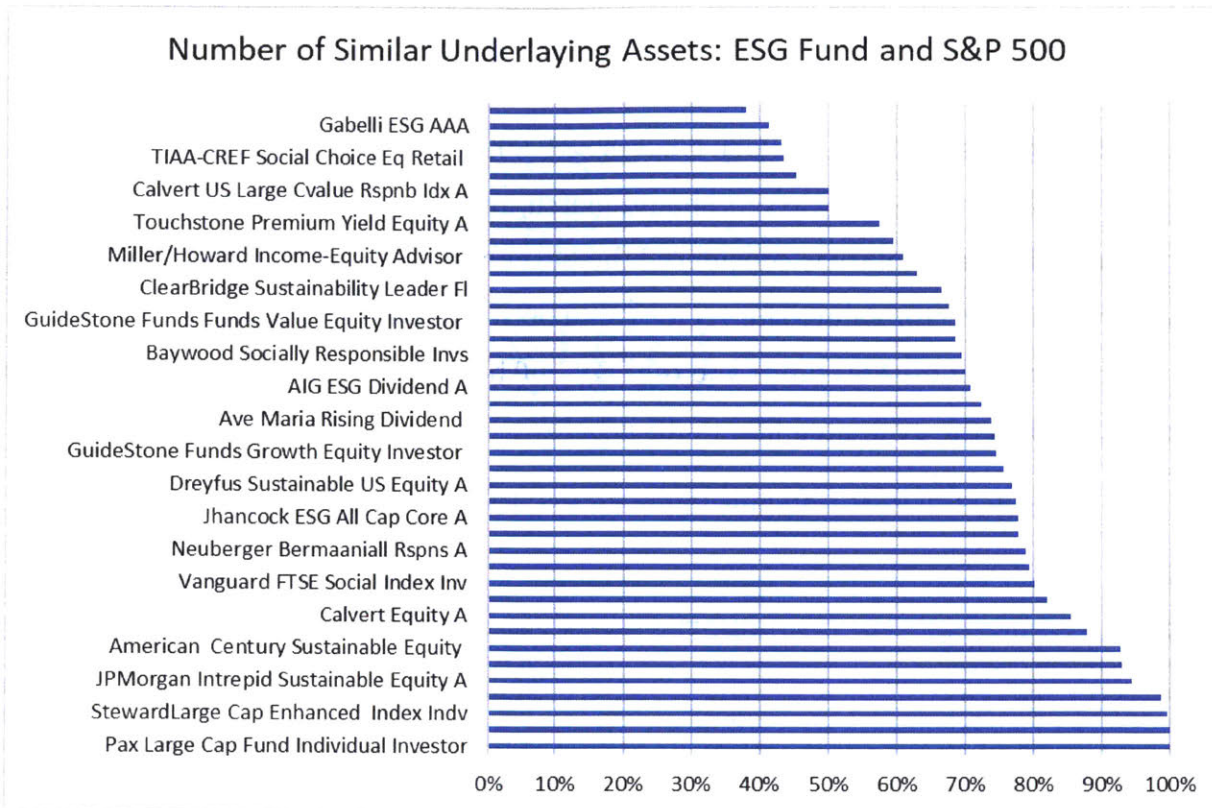


Figure 3-5 Number of Similar Underlying Assets: ESG Fund and S&P 500

Then the asset weights for each fund was pulled. The weight distribution of these funds should sum to 100%. The funds are not exact vehicles however. For example, many of these funds hold a small cash balance when moving in and out of positions to redistribute fund allocations. Although the weight sum does not always add up to 1, each fund was checked, and each was within a .01 of including the full weighting. Comparing funds with weights adding to 1 made comparison significantly easier.

Although there seems to be a fairly significant number of shared assets, this does not give a detailed description of how similar the construction of the ESG funds compared with the S&P 500 benchmark index. The equation for how the summed vector between the underlying assets is below:

$$\text{For all values of } x_i \text{ and } y_i \quad \sum_{i=1}^n |xw_i yw_j|$$

To establish an extremely high or ceiling benchmark, the summed vector between the weightings of the underlying assets of two S&P 500 Index mutual funds, the Vanguard 500 Index Fund (VFINX) and the BlackRock iShares S&P 500 Index Fund. In a perfect match, the weightings of all the underlying assets should match, and the summed vector would be 0. For this study, this benchmark is considered the best possible clone of a benchmark with the lowest possible vector value. The vector value between these two funds is 1.13. The vectors between all of the ESG funds and the S&P 500 benchmark were then calculated. The Vector Values of all the evaluated ESG funds is below:

Table 3-2 Vector Values Between ESG Fund and S&P 500 Index

Fund	Ticker	Fund Vector	Assets Under Management (\$M)	Number of Stocks	Number of Stocks in S&P 500 Index
1 Parnassus Core Equity Investor	PRBLX	74.11	\$ 15,588.00	36	28
2 Parnassus Endeavor Investor	PARWX	91.23	\$ 4,699.00	33	29
3 Vanguard FTSE Social Index Inv	VFTSX	24.56	\$ 3,900.00	456	366
4 TIAA-CREF Social Choice Eq Retail	TICRX	42.45	\$ 2,947.00	583	254
5 Neuberger Bermaaniall Rspns A	NRAAX	76.17	\$ 2,311.00	38	30
6 Calvert Equity A	CSIEX	75.17	\$ 2,203.00	48	41
7 GuideStone Funds Growth Equity Investor	GGEZX	58.28	\$ 1,721.00	102	76
8 GuideStone Funds Funds Value Equity Investor	GVEZX	43.93	\$ 1,458.00	270	185
9 Amana	AMANX	71.51	\$ 1,335.00	40	31
10 Calvert US Large Cap Core Rspnb Index A	CSXAX	19.39	\$ 1,032.00	744	337
11 Parnassus	PARNX	74.11	\$ 1,011.00	40	28
12 GuideStone Funds Equity Index Investor	GEQZX	10.55	\$ 939.00	494	488
13 Domini Impact Equity Investor	DSEFX	74.08	\$ 887.00	137	94
14 Ave Maria Rising Dividend	AVEDX	71.02	\$ 883.00	42	31
15 Pax Large Cap Fund Individual Investor	PAXLX	70.2	\$ 712.00	42	42
16 Brown Advisory Sustainable Growth Adv	BAWAX	67.32	\$ 519.00	37	28
17 StewardLarge Cap Enhanced Index Indv	SEEKX	46.78	\$ 386.00	476	474
18 Dreyfus Sustainable US Equity A	DTCAX	67.56	\$ 306.00	39	30
19 Green Century Equity	GCEQX	43.32	\$ 237.00	361	227
20 American Century Sustainable Equity	AFDIX	57.38	\$ 236.00	96	89
21 Walden Equity	WSEFX	68.35	\$ 194.00	74	55
22 Calvert US Large Cvalue Rspnb Idx A	CFJAX	44.98	\$ 143.00	522	261
23 Touchstone Premium Yield Equity A	TPYAX	59.86	\$ 120.00	47	27
24 Miller/Howard Income-Equity Advisor	MHIDX	52.8	\$ 105.00	46	28
25 TIAA-CREF Social Choice LwCrbn Eq Retl	TLWCX	44.82	\$ 100.00	584	222
26 Gabelli ESG AAA	SRIGX	44.4	\$ 62.00	58	24
27 Calvert US Large Cap Growth Rspnb Idx A	CGJAX	37.1	\$ 58.00	522	225
28 Ariel Focus Investor	ARFFX	63.63	\$ 56.00	31	21
29 BlackRock Impact US Equity Investre A	BIRAX	41.2	\$ 52.00	361	181
30 Jhancock ESG Large Cap Core A	JHJAX	65.76	\$ 39.00	78	62
31 American Trust Allegiance	ATAFX	48.3	\$ 26.00	42	25
32 TCW New America Premier Equities N	TGUNX	56.14	\$ 21.00	29	21
33 Jhancock ESG All Cap Core A	JHKAX	63.12	\$ 21.00	81	63
34 AIG ESG Dividend A	EDFAX	66.97	\$ 21.00	41	29
35 JPMorgan Intrepid Sustainable Equity A	JICAX	66.08	\$ 20.00	71	67
36 Epiphany FFV A	EPVNX	73.42	\$ 19.00	57	57
37 Monteagle Select Value I	MVEIX	85.06	\$ 13.00	28	26
38 Glenmede Responsible ESG US Equity	RESGX	69.89	\$ 12.00	100	82
39 Baywood Socially Responsible Invs	BVSNX	60.19	\$ 8.00	46	32
40 ClearBridge Sustainability Leader FI	LCSTX	61.51	\$ 4.00	45	30

Most importantly, the measure that this study used to determine similarity to the S&P 500 is to measure how much of the total fund has the same underlying assets. Out of total weighting of 1, all underlying assets within the S&P 500 and the ESG fund were taken from FactSet on the same non-trading day. Then, for the stocks which both the S&P 500 and the ESG shared, the smaller of the two weightings was recorded as the shared weighting between the index and the ESG fund. The equation of this calculation is below:

Weighting of companies shared with S&P 500

$$\sum \min(xw_i, yw_i)$$

Finally, the sum was taken of all the shared weightings. This number represents the total percentage of each ESG fund that has exactly the same assets and how much of those assets as the S&P 500; that portion of the fund moves exactly the same as the S&P 500 in the market.

Also to understand what additional stocks the ESG fund might have added, the weightings of the stocks not also in the S&P 500 were identified. The sum of the weightings of the stocks not identified was found for each ESG fund. The equation for this calculation is below:

Weighting of companies not in the S&P 500

$$\sum_{i=1}^n xw_i \notin yw_i$$

A compiled list of 40 largest ESG funds shared weightings with the S&P 500, and the summed weighting of each fund that is not shared with the S&P 500 is on the list below:

Table 3-3 ESG Funds and S&P 500, Similar and Not Similar Underlying Assets

	Ticker	Number of Stocks	Assets Under Management (\$M)	Same Weighting	Weighting Not In SP50
Parnassus Core Equity Investor	PRBLX	36	\$ 15,588.00	7.35	19.34
Parnassus Endeavor Investor	PARWX	33	\$ 4,699.00	7.01	7.93
Vanguard FTSE Social Index Inv	VFTSX	456	\$ 3,900.00	70.52	5
TIAA-CREF Social Choice Eq Retail	TICRX	583	\$ 2,947.00	47.06	12.63
Neuberger Bermaaniall Rspns A	NRAAX	38	\$ 2,311.00	9.79	14.05
Calvert Equity A	CSIEX	48	\$ 2,203.00	19.71	8.49
GuideStone Funds Growth Equity Investor	GGEZX	102	\$ 1,721.00	30.82	16.51
GuideStone Funds Funds Value Equity Inv	GVEZX	270	\$ 1,458.00	32.14	6.99
Amana	AMANX	40	\$ 1,335.00	17.96	15.53
Calvert US Large Cap Core Rspnb Index A	CSXAX	744	\$ 1,032.00	67.68	13.58
Parnassus	PARNX	40	\$ 1,011.00	7.35	19.34
GuideStone Funds Equity Index Investor	GEQZX	494	\$ 939.00	92.68	0.08
Domini Impact Equity Investor	DSEFX	137	\$ 887.00	21.22	18.69
Ave Maria Rising Dividend	AVEDX	42	\$ 883.00	9.17	19.8
Pax Large Cap Fund Individual Investor	PAXLX	42	\$ 712.00	27.73	2.09
Brown Advisory Sustainable Growth Adv	BAWAX	37	\$ 519.00	16.32	17.09
StewardLarge Cap Enhanced Index Indv	SEEKX	476	\$ 386.00	70.20	0.22
Dreyfus Sustainable US Equity A	DTCAX	39	\$ 306.00	12.70	20.16
Green Century Equity	GCEQX	361	\$ 237.00	33.12	0.36
American Century Sustainable Equity	AFDIX	96	\$ 236.00	42.71	3.56
Walden Equity	WSEFX	74	\$ 194.00	33.66	4.32
Calvert US Large Cvalue Rspnb Idx A	CFJAX	522	\$ 143.00	43.68	12.58
Touchstone Premium Yield Equity A	TPYAX	47	\$ 120.00	9.29	35.53
Miller/Howard Income-Equity Advisor	MHIDX	46	\$ 105.00	9.46	36.97
TIAA-CREF Social Choice LwCrbn Eq Retl	TLWCX	584	\$ 100.00	43.25	13.57
Gabelli ESG AAA	SRIGX	58	\$ 62.00	4.57	51.04
Calvert US Large Cap Growth Rspnb Idx A	CGJAX	522	\$ 58.00	49.71	14.73
Ariel Focus Investor	ARFFX	31	\$ 56.00	7.24	30.12
BlackRock Impact US Equity Investre A	BIRAX	361	\$ 52.00	50.09	22.71
Jhancock ESG Large Cap Core A	JHJAX	78	\$ 39.00	22.57	16.1
American Trust Allegiance	ATAFX	42	\$ 26.00	14.09	38.39
TCW New America Premier Equities N	TGUNX	29	\$ 21.00	9.76	34.42
Jhancock ESG All Cap Core A	JHKAX	81	\$ 21.00	18.42	19.98
AIG ESG Dividend A	EDFAX	41	\$ 21.00	8.06	25.22
JPMorgan Intrepid Sustainable Equity A	JICAX	71	\$ 20.00	30.37	3.7
Epiphany FFV A	EPVNX	57	\$ 19.00	29.24	0.15
Monteagle Select Value I	MVEIX	28	\$ 13.00	6.11	9.12
Glenmede Responsible ESG US Equity	RESGX	95	\$ 12.00	20.67	12.37
Baywood Socially Responsible Invs	BVSNX	46	\$ 8.00	11.71	29.53
ClearBridge Sustainability Leader FI	LCSTX	45	\$ 4.00	16.85	21.66

The shared weightings of all 40 ESG Funds taken together, and adjusted for the fund's weighting based on AUM, is only 23.62%. There are some funds which have a high correlation, such as Guidestone's Funds Equity Index Investor (GEQZX) which shares 92.68% of its fund with the S&P 500. However on the other end of the spectrum, Gabelli ESG AAA only shares 4.57% of its underlying assets with the S&P 500.

There is a problem with direct weighting comparisons. Following the hypothesis, that the S&P 500, or a similar index fund, is the starting point for creating an index, the expectation is the non-ESG stocks would be removed. This would imply that the S&P 500 stocks that are shared would be underweighted because of the greater number of stocks in the index. In order to account for that, it would be necessary to reweight the S&P 500 after eliminating the companies that the S&P 500 index fund does not share with the ESG fund. The equities that are unique to the ESG fund would remain. A second underlying asset comparison was calculated.

This adjusted comparison first identified which equities were not included in the compared ESG fund. Then the summed weight of the not non-ESG equities in each fund comparison were used to determine constant to adjust the weight to the remaining equities in the S&P 500. This multiplier constant when multiplied to the remaining S&P 500 equity weightings would bring the total adjusted weight to 1. The sum of the remaining S&P 500 weights were then considered the new adjusted percentage similar underlying assets.

The summed adjusted weights, and the original weights are in the table below. Some percentages of shared underlying assets did not change. Other scores changed drastically. The scores which tended to change the most drastically were the funds with fewer number of assets. The summed total from the unadjusted score to the weight adjusted score changed from 23.62% to 54.67% while still accounting for weighting of AUM.

Table 3-4 Adjusted S&P 500 Weights

	Ticker	Number stocks	Assets Under Management (\$M)	Raw Similar Weighting	Adjusted Similar Weighting
Parnassus Core Equity Investor	PRBLX	36	\$ 15,588.00	\$ 7.35	\$ 49.16
Parnassus Endeavor Investor	PARWX	33	\$ 4,699.00	\$ 7.01	\$ 42.48
Vanguard FTSE Social Index Inv	VFTSX	456	\$ 3,900.00	\$ 70.52	\$ 92.56
TIAA-CREF Social Choice Eq Retail	TICRX	583	\$ 2,947.00	\$ 47.06	\$ 47.06
Neuberger Bermaaniall Rspns A	NRAAX	38	\$ 2,311.00	\$ 9.79	\$ 53.76
Calvert Equity A	CSIEX	48	\$ 2,203.00	\$ 19.71	\$ 53.12
GuideStone Funds Growth Equity Investor	GGEZX	102	\$ 1,721.00	\$ 30.82	\$ 60.29
GuideStone Funds Funds Value Equity Inv	GVEZX	270	\$ 1,458.00	\$ 32.14	\$ 55.12
Amana	AMANX	40	\$ 1,335.00	\$ 17.96	\$ 21.07
Calvert US Large Cap Core Rspnb Index A	CSXAX	744	\$ 1,032.00	\$ 67.68	\$ 81.18
Parnassus	PARNX	40	\$ 1,011.00	\$ 7.35	\$ 49.16
GuideStone Funds Equity Index Investor	GEQZX	494	\$ 939.00	\$ 92.68	\$ 94.10
Domini Impact Equity Investor	DSEFX	137	\$ 887.00	\$ 21.22	\$ 37.94
Ave Maria Rising Dividend	AVEDX	42	\$ 883.00	\$ 9.17	\$ 60.42
Pax Large Cap Fund Individual Investor	PAXLX	42	\$ 712.00	\$ 27.73	\$ 64.12
Brown Advisory Sustainable Growth Adv	BAWAX	37	\$ 519.00	\$ 16.32	\$ 49.18
StewardLarge Cap Enhanced Index Indv	SEEKX	476	\$ 386.00	\$ 70.20	\$ 73.42
Dreyfus Sustainable US Equity A	DTCAX	39	\$ 306.00	\$ 12.70	\$ 51.00
Green Century Equity	GCEQX	361	\$ 237.00	\$ 33.12	\$ 62.14
American Century Sustainable Equity	AFDIX	96	\$ 236.00	\$ 42.71	\$ 65.85
Walden Equity	WSEFX	74	\$ 194.00	\$ 33.66	\$ 65.32
Calvert US Large Cvalue Rspnb Idx A	CFJAX	522	\$ 143.00	\$ 43.68	\$ 43.68
Touchstone Premium Yield Equity A	TPYAX	47	\$ 120.00	\$ 9.29	\$ 50.42
Miller/Howard Income-Equity Advisor	MHIDX	46	\$ 105.00	\$ 9.46	\$ 44.25
TIAA-CREF Social Choice LwCrbn Eq Retl	TLWCX	584	\$ 100.00	\$ 43.25	\$ 43.25
Gabelli ESG AAA	SRIGX	58	\$ 62.00	\$ 4.57	\$ 29.92
Calvert US Large Cap Growth Rspnb Idx A	CGJAX	522	\$ 58.00	\$ 49.71	\$ 49.71
Ariel Focus Investor	ARFFX	31	\$ 56.00	\$ 7.24	\$ 41.61
BlackRock Impact US Equity Investre A	BIRAX	361	\$ 52.00	\$ 50.09	\$ 54.00
Jhancock ESG Large Cap Core A	JHJAX	78	\$ 39.00	\$ 22.57	\$ 53.09
American Trust Allegiance	ATAFX	42	\$ 26.00	\$ 14.09	\$ 38.55
TCW New America Premier Equities N	TGUNX	29	\$ 21.00	\$ 9.76	\$ 39.00
Jhancock ESG All Cap Core A	JHKAX	81	\$ 21.00	\$ 18.42	\$ 50.99
AIG ESG Dividend A	EDFAX	41	\$ 21.00	\$ 8.06	\$ 46.19
JPMorgan Intrepid Sustainable Equity A	JICAX	71	\$ 20.00	\$ 30.37	\$ 66.76
Epiphany FFV A	EPVNX	57	\$ 19.00	\$ 29.24	\$ 66.85
Monteagle Select Value I	MVEIX	28	\$ 13.00	\$ 6.11	\$ 38.28
Glenmede Responsible ESG US Equity	RESGX	100	\$ 12.00	\$ 20.67	\$ 51.59
Baywood Socially Responsible Invs	BVSNX	46	\$ 8.00	\$ 11.71	\$ 43.66
ClearBridge Sustainability Leader FI	LCSTX	45	\$ 4.00	\$ 16.85	\$ 51.57

4. Analysis of Systemic ESG Construction

Even with the adjusted weightings, sharing 54.67% of the total AUM of all 40 ESG funds is not conclusive evidence that ESG funds are systemically constructed from the S&P 500 index. The correlation is not as strong as the hypothesis would imply. However, there is strong evidence that some funds are significantly similar to the S&P 500 minus a portion of the index removed as non-ESG compliant.

Interesting is that there is a high amount of overlap in companies. Yet even after reweighting the S&P 500 after eliminating the stocks would account for the disparity in weights, however there was not high similarity. The funds and the S&P 500 have a lot of overlapping companies, but how they weight the companies is not the same.

Not all of the funds that were tested in this study stated the S&P 500 as its benchmark. Other benchmarks, though in limited number, include the Russell 1000, Russell 3000, Russell 1000 Value, Russell 1000 Growth, Russell 3000 and Russell 3000 Value. There were also a few stocks which published their benchmark against another product the fund provider offered. If this was the case, this study used the first benchmark which was a widely used index. If a fund did not publish a benchmark, then it was benchmarked against the S&P 500.

Initially sample testing was done. Interestingly, in the sample group there was often a higher overlap with the S&P 500 than with a fund's stated benchmark such as the Russell 1000. For larger indices, such as the Russell 3000, much of the explanation why these funds were more closely correlated with the S&P 500 is because the smaller capitalization stocks were less heavily weighted than the larger capitalization stocks shifting fund weight closer toward a S&P 500 weighting distribution. The similarities in weighting to the S&P 500 and the fund's published benchmark, as well as the vector between the two measures is in the table below.

Table 3-5 Similarity Fund Underlying Assets S&P 500 and Benchmark

Underlying Asset	Number of Stocks	AUM	Percent Similar		Published Benchmark
			Similar to S&P 500	to Published Benchmark	
Parnassus Core Equity Investor	36	\$ 15,588.00	7.35	7.35	0.00 S&P 500
Parnassus Endeavor Investor	33	\$ 4,699.00	7.01	6.71	0.30 S&P 500
Vanguard FTSE Social Index Inv	456	\$ 3,900.00	70.52	70.52	0.00 S&P 500
TIAA-CREF Social Choice Eq Retail	583	\$ 2,947.00	47.06	42.87	4.19 Russell 3000
Neuberger Bermaaniall Rspns A	38	\$ 2,311.00	9.79	9.79	0.00 S&P 500
Calvert Equity A	48	\$ 2,203.00	19.71	17.61	2.10 Calvert U.S. Large Cap
GuideStone Funds Growth Equity Investor	102	\$ 1,721.00	30.82	39.27	8.45 Russell 1000 Growth
GuideStone Funds Funds Value Equity Invt	270	\$ 1,458.00	32.14	51.55	19.41 Russell 1000 Value
Amana	40	\$ 1,335.00	17.96	17.40	0.56 S&P 500
Calvert US Large Cap Core Rspnb Index A	744	\$ 1,032.00	67.68	67.22	0.46 Calvert U.S. Large Cap
Parnassus	40	\$ 1,011.00	7.35	7.35	0.00 S&P 500
GuideStone Funds Equity Index Investor	494	\$ 939.00	92.68	92.68	0.00 S&P 500
Domini Impact Equity Investor	137	\$ 887.00	21.22	21.22	0.00 S&P 500
Ave Maria Rising Dividend	42	\$ 883.00	9.17	9.17	0.00 S&P 500
Pax Large Cap Fund Individual Investor	42	\$ 712.00	27.73	27.73	0.00 S&P 500
Brown Advisory Sustainable Growth Adv	37	\$ 519.00	16.32	26.56	10.24 Russell 1000 Growth
StewardLarge Cap Enhanced Index Indv	476	\$ 386.00	70.2	70.20	0.00 S&P 500
Dreyfus Sustainable US Equity A	39	\$ 306.00	12.7	12.70	0.00 S&P 500
Green Century Equity	361	\$ 237.00	33.12	33.12	0.00 S&P 500
American Century Sustainable Equity	96	\$ 236.00	42.71	42.71	0.00 S&P 500
Walden Equity	74	\$ 194.00	33.66	33.66	0.00 S&P 500
Calvert US Large Cvalue Rspnb Idx A	522	\$ 143.00	43.68	50.49	6.81 Calvert U.S. Large Cap
Touchstone Premium Yield Equity A	47	\$ 120.00	9.29	39.34	30.05 Russell 3000 Value
Miller/Howard Income-Equity Advisor	46	\$ 105.00	9.46	9.46	0.00 N/A
TIAA-CREF Social Choice LwCrbn Eq Retl	584	\$ 100.00	43.25	38.84	4.41 Russell 3000
Gabelli ESG AAA	58	\$ 62.00	4.57	4.57	0.00 S&P 500
Calvert US Large Cap Growth Rspnb Idx A	522	\$ 58.00	49.71	73.02	23.31 Calvert U.S. Large Cap
Ariel Focus Investor	31	\$ 56.00	7.24	7.24	0.00 S&P 500
BlackRock Impact US Equity Investre A	361	\$ 52.00	50.09	48.80	1.29 Russell 1000
Jhancock ESG Large Cap Core A	78	\$ 39.00	22.57	22.57	0.00 S&P 500
Boston Common ESG Impact Equity	100	\$ 35.02	26.19	26.19	0.00 S&P 500
American Trust Allegiance	42	\$ 26.00	14.09	14.09	0.00 S&P 500
AIG ESG Dividend A	41	\$ 21.00	9.76	7.28	2.48 Russell 1000
Jhancock ESG All Cap Core A	81	\$ 21.00	18.42	18.42	0.00 N/A
TCW New America Premier Equities N	29	\$ 21.00	8.06	8.89	0.83 Russell 1000
JPMorgan Intrepid Sustainable Equity A	71	\$ 20.00	30.37	25.07	5.30 Russell 3000
Epiphany FFV A	57	\$ 19.00	29.24	29.24	0.00 S&P 500
Glenmede Responsible ESG US Equity		\$ 17.28	6.11	20.67	14.56 Russell 1000
Monteagle Select Value I	28	\$ 13.00	20.67	2.51	18.16 S&P 500
Baywood Socially Responsible Invs	46	\$ 8.00	11.71	12.85	1.14 Russell 1000 Value
ClearBridge Sustainability Leader FI	45	\$ 4.00	16.85	13.86	2.99 Russell 3000

Even when measured against the fund's published benchmark, the weighted overlap in underlying assets is not high. Potential causes for this high asset overlap, yet low correlation is that during construction of the funds, fund creators naturally gravitate toward high quality companies that are included in the S&P 500. Another possible

explanation is that fund construction begins with an S&P 500 baseline, and then drastically changes the fund's weightings using ESG ratings but tend not to change the underlying pool of assets. Yet another possible explanation is the use of filtered S&P 500 companies, which are then re-optimized for necessary risk and return characteristics. When the fund no longer follows a strict rule of weighting based on valuation, like the S&P 500, the use of risk and return optimization hedging would likely drastically change the fund weighting. Finally a highly possible reason is that the observation is just noise, and there is spurious correlation that the companies overlap.

To gain more insights into systematic motivation and process in fund construction, this study ran several regressions comparing percentage of the underlying assets compared against their benchmark. First is the question of how correlated are funds with highly similar underlying assets to returns. For many of the funds, the fund was too new to post returns for more than 5 years. The charts below show the correlation below how unique the fund is vs its benchmark. The returns are in either a 3 month, 1 year or 3 year time interval.

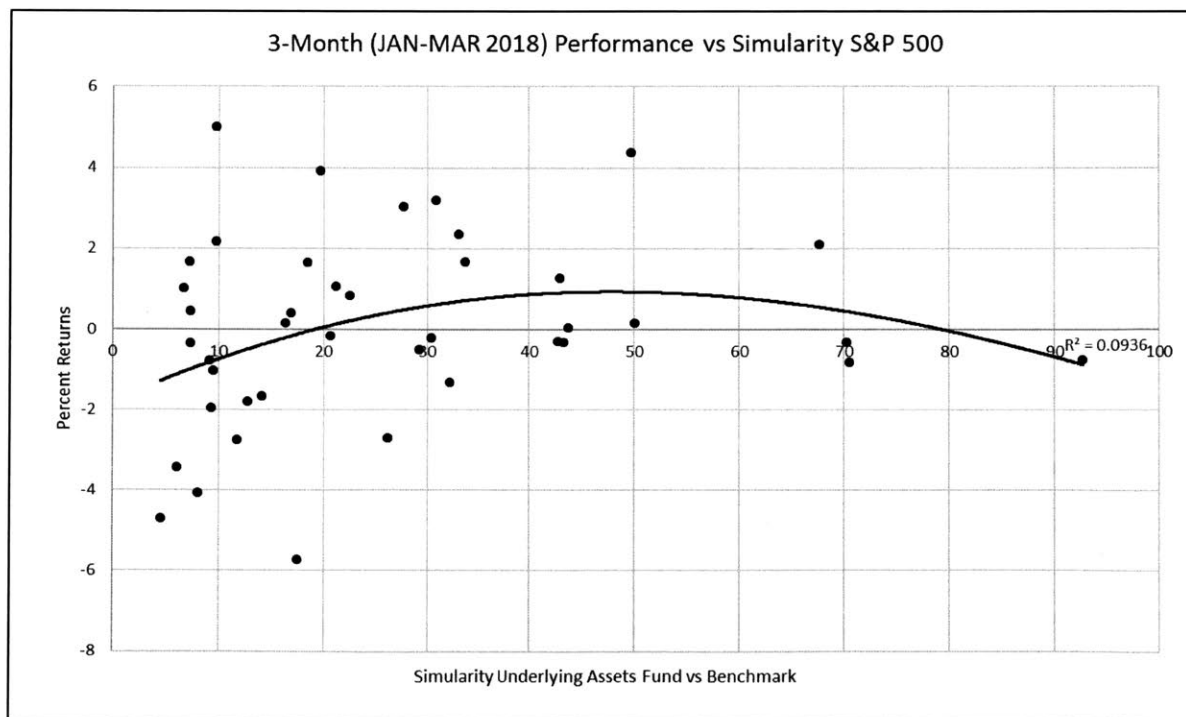


Figure 3-6 3-Month Performance vs Similarity S&P 500

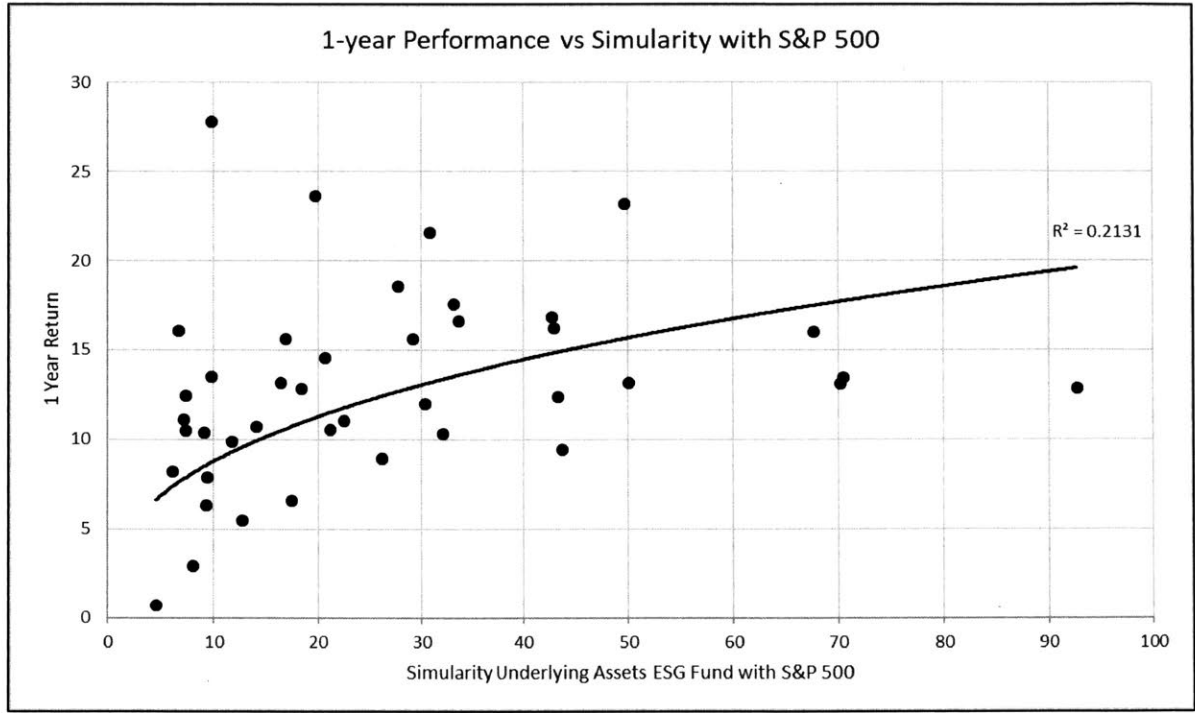


Figure 3-7 1-Year Performance vs Similarity with S&P 500

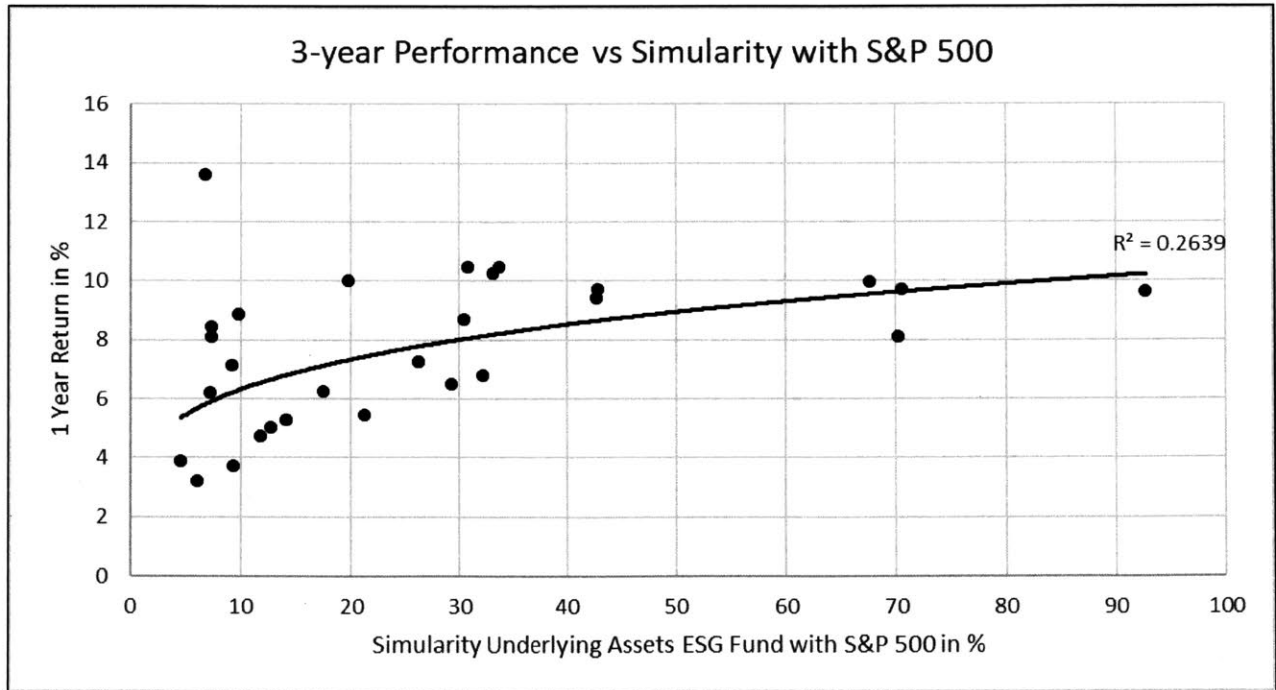


Figure 3-8 3-Year Similarity with S&P 500

There is statically limited significant information from the regressions; however, there is some information. Although the trend could be attributed to small sample size, the variation reduces as funds become more similar to their benchmark.

Aside from performance and risk, there are two interesting characteristics that an ESG fund could commonly be evaluated against: ESG rating and fund cost. ESG ratings differ among data providers. For this study, ratings were taken from Morningstar to maintain consistency of measuring criteria. Instead of using the more common 1-5 star Morningstar ESG ratings system, the fund's ESG rating percentile was used to better understand the differences in each fund's ESG score. Surprisingly for dedicated ESG funds, three funds scored very poorly in Morningstar's ESG rating. The results of the regression, Morningstar ESG ratings to similarity to underlying assets, is below.

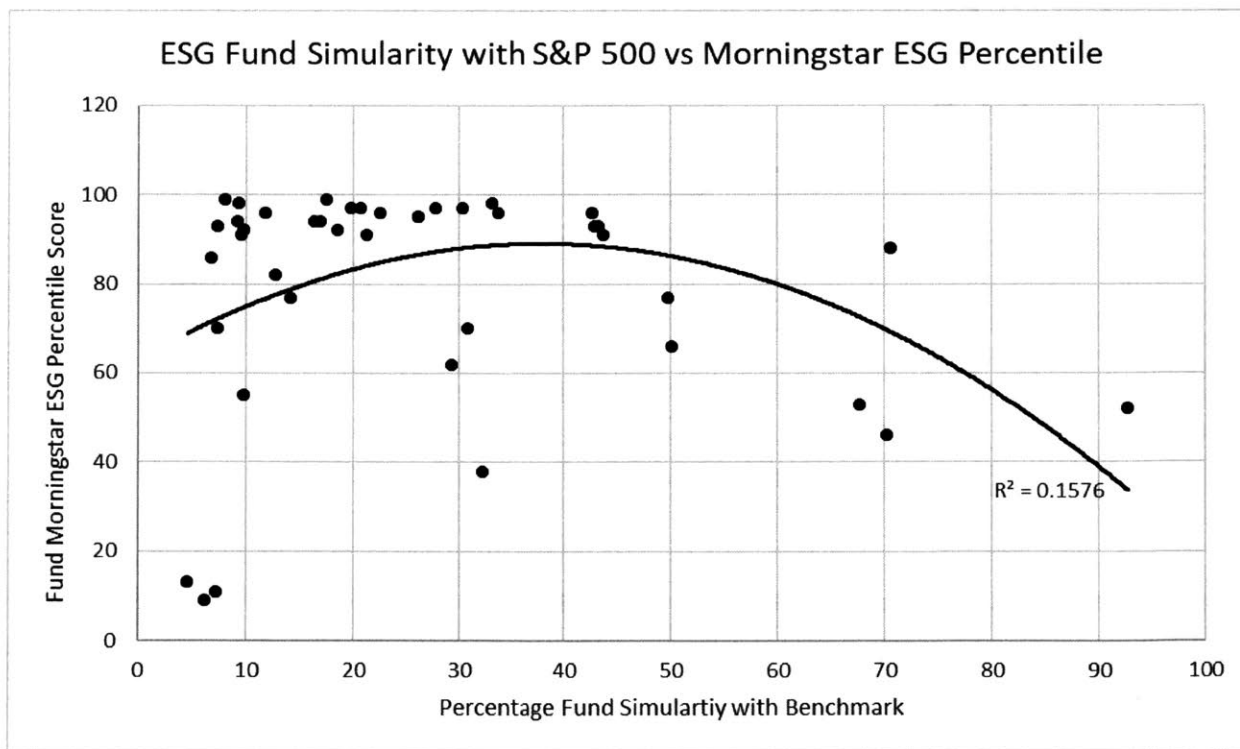


Figure 3-9 ESG Fund Similarity with S&P 500 vs Morningstar ESG Percentiles

The other measurement commonly used to choose between funds, which this study compared against similarity to an ESG fund benchmark, is cost or fund management fee. The more a fund differs from its index benchmark, one could reasonably deduce the more work is required for equity research to find other equities to balance out the fund, while still maintaining the desired risk and reward characteristics. To test this, a regression between management fee and fund similarity is below.

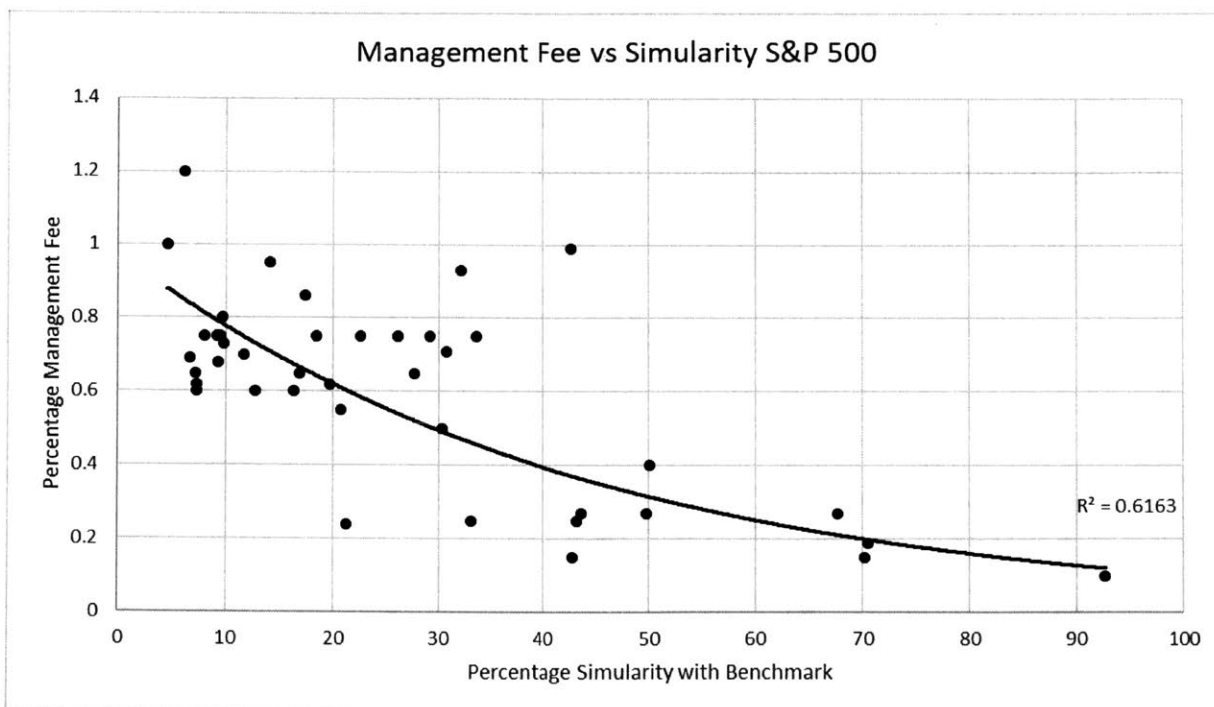


Figure 3-10 Management Fee vs Similarity S&P 500

The plot above does provide evidence that as funds become more unique, and less of their underlying assets are like that of the their benchmark, their management fee does increase. This is interesting as this suggests a fair increased management fee the more unique the ESG fund becomes.

Nevertheless with higher management fees, for an ESG specific fund, is there then also higher ESG score? One could also deduce that with a more unique fund and the higher management cost, differing more from its benchmark, the fund should score higher in its

ESG score. Essentially, the higher the management fee, the fund should become a better scoring ESG fund. The plot below is regression between a fund's management fee and the fund's ESG score percentile.

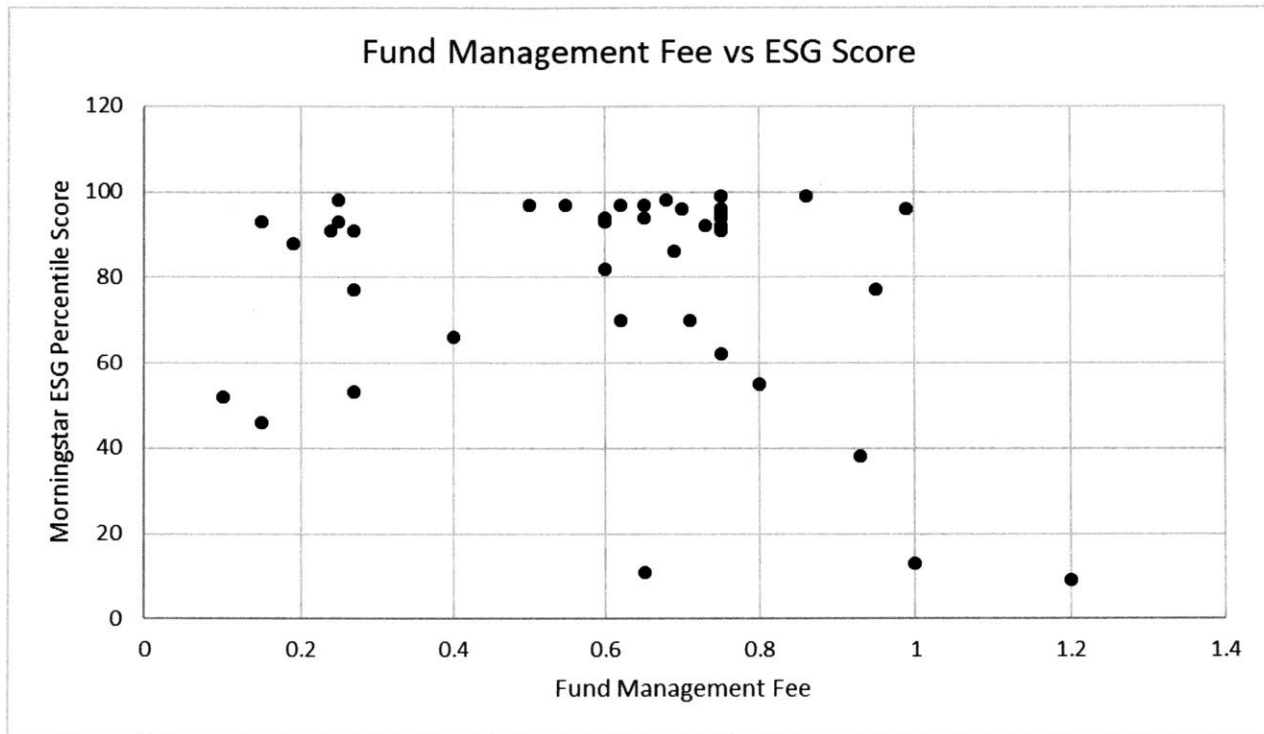


Figure 3-11 Fund Management Fee vs ESG Score

Interestingly, the plot suggests that a fund's management fee does not indicate a better fund which scores better on ESG factors. Yet from the previous plot, a higher management fee does indicate a more unique fund. Systemically, however the focus of higher management does not appear to be directed at making the ESG fund a better scoring ESG investment fund.

5. Conclusions

5.1 Summary of Background Research

This research began with investigating the current and historic literature of ESG investing. Through the literature review, the origins of corporate social responsible investing was covered. ESG investing today is a deviation from traditional measures of asset management, balancing risk and return. There is significant amount of research both finding ESG can, and does not perform as well against a benchmark. There also supporting research stating that ESG funds can reduce longer term volatility, and have benefits other than higher returns. However, the investment case for ESG funds remain inconclusive concerning return performance.

This study then surveyed the current landscape of available ESG funds. Despite the lack of evidence of a strong investment case, ESG funds exist today because investors want them. However, there is evidence for potentially better ESG screening, resulting in lower costs and better performance. There are multiple companies that offer ESG specific funds. However, companies that specialize in ESG types funds often have poor market performance.

5.2 Insights and Findings

The focus of this study was to investigate the underlying assets in ESG specific funds to determine how similar they were to standard industry benchmarks. There are 207 ESG funds listed on financial databases. The vast majority are in mutual funds. Most of the AUM in ESG funds is pooled in a few large funds. Of the largest mutual funds, there was significant overlap in the underlying assets and the S&P 500, however there was also significant differences in how the underlying assets were weighted. Several funds have very similar underlying assets to index funds like the S&P 500, while other funds have very little in common with standard index funds.

Some fund providers specialize in ESG funds. These funds can perform very similarly to S&P 500 even though these funds may have little in common with the underlying assets of

the index. However, it appears that these specialized funds have the least amount of similar underlying assets to an index, suggesting that these were constructed from scratch not from an existing index. Yet they also appear to have the worst market performance.

There was not a one to one exchange with a non-ESG compliant underlying asset with another asset with similar characteristic but was ESG compliant. Size was not a determinate of correlation between the S&P 500 index and an ESG fund, and there is no correlation to how similar the funds are verse the size of the fund. Although, it appears that large firms are more risk adverse, and tend to have funds more similar to a standard index.

This study found that all large cap ESG funds share 72% of companies with S&P 500. However when adjusted for fund weights and AUM, only 23.62% of the underlying assets are the same as S&P 500. If stocks filtered out by ESG funds were eliminated, and the S&P 500 was reweighted, the improved correlation adjusts to 54.62%. However the range of individual correlation varies enormously from 4.57% shared underlying correlation to 92.68%.

There is some evidence that expected returns can increase when a fund is more similar to its benchmark. Or put differently, the more an ESG fund shares its underlying assets with its benchmark, the higher the expected return. Unfortunately, there are not enough funds to conclude this definitely. Furthermore, due to the young age of many of these funds, there is limited information on returns older than 5 years. What does appear fairly conclusive is reduction in variance as the funds become more similar to their benchmark.

Regarding ESG fund management, as funds become more like their benchmark, data evidence suggests that fees do reduce. However when management fees increase, the data supports no evidence of increased performance.

5.2 Future Work

Further study could focus on how small ESG specific funds are constructed, which were out of scope for this study. Also, more research is needed to understand how large funds adjust their ESG fund based on performance and market conditions. Are there ESG risk tolerance

boundaries that a large firms operate within that is more important than ESG ratings? Individual fund providers' risk to ESG priority could be computed through comparing against a mock fund weighted using ESG company scores on S&P 500 member companies. Likewise, a better method to determining what ESG compliance would put more structure into defining ESG investing. Currently funds can vary greatly without a universal means of determining which equities represent companies which are and are not high ESG performers.

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Appendix 1: MSCI Rating Mythology

MSCI ESG Key Issue Hierarchy

3 Pillars	10 Themes	37 ESG Key Issues	
Environment	Climate Change	Carbon Emissions* Energy Efficiency Product Carbon Footprint	Financing Environmental Impact Climate Change Vulnerability
	Natural Resources	Water Stress* Biodiversity & Land Use	Raw Material Sourcing
	Pollution & Waste	Toxic Emissions & Waste* Packaging Material & Waste	Electronic Waste
	Environmental Opportunities	Opportunities in Clean Tech Opportunities in Green Building	Opp's in Renewable Energy
Social	Human Capital	Labor Management* Health & Safety*	Human Capital Development Supply Chain Labor Standards
	Product Liability	Product Safety & Quality Chemical Safety Financial Product Safety	Privacy & Data Security Responsible Investment Health & Demographic Risk
	Stakeholder Opposition	Controversial Sourcing	
	Social Opportunities	Access to Communications Access to Finance	Access to Health Care Opp's in Nutrition & Health
Governance	Corporate Governance*	Board** Pay**	Ownership** Accounting**
	Corporate Behavior	Business Ethics* Anti-Competitive Practices*	Corruption & Instability Financial System Instability

* indicates "universal" issues assessed for all companies in MSCI World

** Board, Pay, Ownership, and Accounting carry weight in the ESG Rating model for all companies. Currently, they contribute to the Corporate Governance score directly and 0-10 sub-scores are not available.

DATA SOURCES

To assess companies' exposure to and management of ESG risks and opportunities, we collect data from the following sources:

- Macro data at segment or geographic level from academic, government, NGO datasets
- Company disclosure (10-K, sustainability report, proxy report, AGM results, etc.)
- Government databases, 1600+ media, NGO, other stakeholder sources

Companies are invited to participate in a formal data verification process.

Ticker	Fund Name	Fund Type	Inception Month	AUM (US\$ millions)	YTD%	1 yr	3 yr	5 yr	10 yr	Prev Yr Rtn %	Mgmt Fee %	Exp Ratio %	Std Dev	Benchmark Used	*as of Mar 3, 2018
						Avg %	Avg %	Avg %	Avg %						
VGSRX	Vert Global Sustainable Real Estate Fund	Int'l Global	Oct-17	\$4.38	-9.5	--	--	--	--	--	0.4	--	--	S&P Global REIT Index	
WSBFX	Walden Asset Management Fund	Balanced	Jun-99	\$122.75	0.68	11.34	7.6	9.45	6.65	14.92	0.75	1	1	5.92 Blend: 60% S&P 500 - 40% BC Aggregate	
WSEFX	Walden Equity Fund	Equity Large Cap	Jun-99	\$203.51	1.67	16.58	10.49	12.88	8.91	20.83	0.75	1	1	8.15 S&P 500 Composite Total Return	
WAMFX	Walden Midcap Fund	Equity Mid-Sm Cap	Aug-11	\$46.16	0.06	13.73	9.28	12.13	--	19.68	0.75	1	1	8.68 Russell Midcap	
WASDX	Walden Small Cap Innovations Fund	Equity Mid-Sm Cap	Oct-08	\$93.05	-2.68	6.55	8.12	9.89	--	11.53	0.75	1	1	10.54 Russell 2000	
WASMX	Walden SMID Cap Innovations Fund	Equity Mid-Sm Cap	Jun-12	\$48.67	0.18	12.09	9.75	11.77	--	16.99	0.75	1	1	9.56 Russell 2500	

Appendix 4: Sample Equity vs S&P 500 Worksheet

	AVEDX	SP50	Similar Vector	Weighting	Weighting not in companies in SP500	Adjusted SP50 Weights	Similarity with adjusted weights
	99.99	99.97	71.02	9.17		19.8	60.4233191
Moodys Corp Com	4.23	0.12	4.11	0.12		1.280683031	1.280683031
Cisco Systems Inc Com	3.83	0.94	2.89	0.94		10.03201708	3.83
Vf Corp Com	3.72	0.1	3.62	0.1		1.067235859	1.067235859
Cognizant Technology Solutions CI A	3.59	0.21	3.38	0.21		2.241195304	2.241195304
Lowe's Cos Inc Com	3.52	0.3	3.22	0.3		3.201707577	3.201707577
TJX Companies Inc Com	3.5	0.22	3.28	0.22		2.34791889	2.34791889
Diageo Plc Sponsored ADR	3.48 0		0		3.48	0	0
Medtronic Plc Com	3.45	0.47	2.98	0.47		5.016008538	3.45
United Parcel Service Inc CI B	3.21	0.32	2.89	0.32		3.415154749	3.21
Schlumberger NV Com	3.07	0.4	2.67	0.4		4.268943436	3.07
Praxair Inc Com	3.06	0.19	2.87	0.19		2.027748132	2.027748132
Zimmer Biomet Holdings Inc Com	3.04	0.1	2.94	0.1		1.067235859	1.067235859
Hexcel Corp Com	3.03 0		0		3.03	0	0
Mondelez International Inc CI A	3.03	0.28	2.75	0.28		2.988260406	2.988260406
Tractor Supply Co Com	2.99	0.03	2.96	0.03		0.320170758	0.320170758
Amgen Inc Com	2.95	0.58	2.37	0.58		6.189967983	2.95
RPM International Inc Com	2.93 0		0		2.93	0	0
MSC Industrial Direct Inc CI A	2.81 0		0		2.81	0	0
Johnson Controls Intl Plc Com	2.65	0.15	2.5	0.15		1.600853789	1.600853789
3M Co Com	2.57	0.6	1.97	0.6		6.403415155	2.57
B&T Corp Com	2.47	0.19	2.28	0.19		2.027748132	2.027748132
Bank of New York Mellon Corp Com	2.44	0.25	2.19	0.25		2.668089648	2.44
Fifth Third Bancorp Com	2.3	0.1	2.2	0.1		1.067235859	1.067235859
Chubb Ltd Com	2.29	0.28	2.01	0.28		2.988260406	2.29
Brown Forman Corp CI B NVG	2.28	0.06	2.22	0.06		0.640341515	0.640341515
US Bancorp/De Com	2.25	0.37	1.88	0.37		3.948772679	2.25
Illinois Tool Works Inc Com	2.18	0.22	1.96	0.22		2.34791889	2.18
Broadridge Financial Solutions Ord	2.14 0		0		2.14	0	0
PNC Financial Services Group Com	2.11	0.32	1.79	0.32		3.415154749	2.11
Exxon Mobil Corp Com	2	1.32	0.68	1.32		14.08751334	2
Donaldson Co Inc Com	1.76 0		0		1.76	0	0
Discover Financial Services Com	1.61	0.12	1.49	0.12		1.280683031	1.280683031
Microchip Technology Inc Com	1.53	0.1	1.43	0.1		1.067235859	1.067235859
Graco Inc Com	1.48 0		0		1.48	0	0
Williams-Sonoma Inc Com	1.47 0		0		1.47	0	0
Omnicom Group Inc Com	1.22	0.07	1.15	0.07		0.747065101	0.747065101
Booking Holdings Inc Com	1.16	0.44	0.72	0.44		4.69583778	1.16
Eaton Corp Plc Com	1.11	0.15	0.96	0.15		1.600853789	1.11
Norfolk Southern Corp Com	0.83	0.17	0.66	0.17		1.814300961	0.83
Polaris Industries Inc Com	0.7 0		0		0.7	0	0
Apple Inc Com	0	3.87	0	0		0	0
Abbott Laboratories Com	0	0.46	0	0		0	0
AbbVie Inc Com	0	0.8	0	0		0	0
Accenture Plc CI A	0	0.42	0	0		0	0
Activision Blizzard Inc Com	0	0.25	0	0		0	0
Acuity Brands Inc Com	0	0.03	0	0		0	0
Adobe Systems Inc Com	0	0.46	0	0		0	0

Appendix 5: Performance, Fees and ESG Score

Underlying Asset		Number			Management			Mornignstar ESG	
		of Stocks	YTD	1 Year	3 Year	5 year	Fee	Exp Ratio	Percentile Score
Parnassus Core Equity Investor	PRBLX	36	0.45	12.46	8.46	12.7	0.6	0.88	93
Parnassus Endeavor Investor	PARWX	33	1.02	16.04	13.6	17.62	0.69	0.95	86
Vanguard FTSE Social Index Inv	VFTSX	456	-0.82	13.46	9.71	13.76	0.19	0.22	88
TIAA-CREF Social Choice Eq Retail	TICRX	583	1.28	16.19	9.72	13.08	0.15	0.44	93
Neuberger Bermaaniall Rspns A	NRAAX	38	2.17	13.51	8.89	12.61	0.73	1.03	92
Calvert Equity A	CSIEX	48	3.92	23.63	10.01	13.79	0.62	1.07	97
GuideStone Funds Growth Equity Investor	GGEZX	102	3.19	21.56	10.47	13.84	0.71	1.04	70
GuideStone Funds Funds Value Equity Investo	GVEZX	270	-1.32	10.34	6.8	10.45	0.93	0.89	38
Amana	AMANX	40	-5.71	6.58	6.25	8.98	0.86	1.15	99
Calvert US Large Cap Core Rspnb Index A	CSXAX	744	2.11	16.01	9.98	14.5	0.27	0.54	53
Parnassus	PARNX	40	-0.35	10.51	8.12	14.43	0.62	0.84	70
GuideStone Funds Equity Index Investor	GEQZX	494	-0.75	12.84	9.63	12.73	0.1	0.41	52
Domini Impact Equity Investor	DSEFX	137	1.07	10.53	5.43	11.66	0.24	1.14	91
Ave Maria Rising Dividend	AVEDX	42	-0.78	10.39	7.14	10.42	0.75	0.92	94
Pax Large Cap Fund Individual Investor	PAXLX	42	3.03	18.56			0.65	0.95	97
Brown Advisory Sustainable Growth Adv	BAWAX	37	0.16	13.14			0.6	0.89	94
StewardLarge Cap Enhanced Index Indv	SEEKX	476	-0.32	13.12	8.12	12.23	0.15	0.82	46
Dreyfus Sustainable US Equity A	DTCAX	39	-1.8	5.49	5.04	9.97	0.6	1.08	82
Green Century Equity	GCEQX	361	2.35	17.54	10.27	13.99	0.25	1.25	98
American Century Sustainable Equity	AFDIX	96	-0.29	16.83	9.41	12.5	0.99	0.99	96
Walden Equity	WSEFX	74	1.67	16.58	10.49	12.88	0.75	1	96
Calvert US Large Cvalue Rspnb Idx A	CFJAX	522	0.04	9.44			0.27	0.57	91
Touchstone Premium Yield Equity A	TPYAX	47	-1.95	6.33	3.72	6.59	0.68	1.2	98
Miller/Howard Income-Equity Advisor	MHIDX	46	-1.03	7.89			0.75	1.24	91
TIAA-CREF Social Choice LwCrbn Eq Retl	TLWCX	584	-0.32	12.36			0.25	0.71	93
Gabelli ESG AAA	SRIGX	58	-4.7	0.7	3.87	7.24	1	1.68	13
Calvert US Large Cap Growth Rspnb Idx A	CGJAX	522	4.38	23.18			0.27	0.57	77
Ariel Focus Investor	ARFFX	31	1.68	11.08	6.22	9.74	0.65	1	11
BlackRock Impact US Equity Investre A	BIRAX	361	0.16	13.14			0.4	0.89	66
Jhancock ESG Large Cap Core A	JHJAX	78	0.83	11.07			0.75		96
Boston Common ESG Impact Equity	BCAMX	100	-2.7	8.94	7.25	11.24	0.75	1	95
American Trust Allegiance	ATAFX	42	-1.66	10.71	5.28	8.48	0.95	1.45	77
AIG ESG Dividend A	EDFAX	41	-4.07	2.93			0.75		99
Jhancock ESG All Cap Core A	JHKAX	81	1.65	12.82			0.75		92
TCW New America Premier Equities N	TGUNX	29	5.02	27.79			0.8	1.04	55
JPMorgan Intrepid Sustainable Equity A	JICAX	71	-0.2	11.99	8.7	12.54	0.5	1.15	97
Epiphany FV A	EPVNX	57	-0.51	15.58	6.52	10.08	0.75	1.5	62
Glenmede Responsible ESG US Equity	RESGX	100	-0.15	14.57			0.55		97
Monteagle Select Value I	MVEIX	28	-3.42	8.23	3.22	10.36	1.2	1.44	9
Baywood Socially Responsible Invs	BVSNX	46	-2.74	9.88	4.74	7.51	0.7	1.14	96
ClearBridge Sustainability Leader FI	LCSTX	45	0.4	15.61			0.65	0.75	94