International Journal of Business & Economic Studies
Year: 2023, Vol: 5, No:1, pp.31-48
https://doi.org/10.54821/uiecd.1258344

The Compliance of ESG Equity Funds in the U.S.

ABD'deki ESG Sermaye Fonlarının Uyumu

Gerasimos ROMPOTIS
Dr., National and Kapodistrian University of Athens MBA
geras3238@yahoo.gr
https://orcid.org/0000-0002-1148-8115

Received : 01.03.2023
Revised : 21.03.2023
Accepted : 29.03.2023
Type of Article : Research

ABSTRACT

This paper assesses the level of adherence of the U.S. equity index funds to best practices from an Environmental, Social and Governance (ESG) perspective. The sample includes 27 ESG index funds and the study period spans from 1 August 2017 to 31 July 2022. A simple research approach is employed. First, the correlations of index funds with the S&P 500 Index, as well as, with three alternative broad market ESG indexes, are computed. Corresponding betas are estimated too. Then, the portion of the S&P 500 stocks with severe or high Morningstar ESG risk scores held by each fund is calculated. The findings reveal an average correlation of ESG index funds with the S&P 500 Index of 0.90. Similar correlation figures with the other indexes are computed. Betas with all indexes are very high, approximating unity. Moreover, about 26% of the funds invest more than 5% of their assets in S&P 500 stocks with high or severe ESG risk. The findings combined indicate that, to a large extent, ESG index funds just track the S&P 500 Index, while marketing themselves as being ESG compliant. The latter can be indicative of some level of "greenwashing" on behalf of index funds.

Keywords:
Index Funds,
ESG,
Greenwashing,
S&P 500 Index

Jel Codes:
G11, G41

ÖZET

Bu çalışma ABD hisse senedi endeksi fonlarının Çevresel, Sosyal ve Yönetişim (ESG) perspektifinden en iyi uygulamalara uyum düzeyini değerlendirmektedir. Örneklem 27 ESG endeks fonunu içermekte ve çalışma dönemi 1 Ağustos 2017 ile 31 Temmuz 2022 arasındadır. Basit bir araştırma yaklaşımı uygulanmaktadır. İlk olarak, endeks fonlarının S&P 500 Endeksi ve ayrıca üç alternatif geniş piyasa ESG endeksi ile korelasyonları hesaplanmıştır. Karşılık gelen betalar da tahmin edilmektedir. Ardından, S&P 500 hisselerinin her bir fonun elinde bulundurduğu ciddi veya yüksek Morningstar ESG risk skorları olan kısmı hesaplanmıştır. Bulgular, ESG endeks fonlarının S&P 500 Endeksi ile 0,90'lık ortalama bir korelasyonunu ortaya koymaktadır. Diğer endekslerle benzer korelasyon değerleri hesaplanmıştır. Tüm endekslere sahip betalar çok yüksektir ve topluluğan yaklaşmaktadır. Ayrıca, fonların yaklaşık %26'sı varlıklarının %5'inden fazlasını yüksek veya ciddi ESG riski olan S&P 500 hisselerine yatırmaktadır. Sonuç olarak ESG endeks fonlarının kendilerini ESG uyumlu olarak pazarlarken büyük ölçüde sadece S&P 500 endeksini izlediğini göstermektedir. İkincisi, endeks fonları adına bir düzeyde "greenwashing" göstergesi olabilir.

Anahtar Kelimeler:
Endeks Fonları,
ESG,
Greenwashing,
S&P 500 Endeksi

Jel Kodları:
G11, G41

Suggested Citation: Rompotis, G. (2023). The Compliance of ESG equity funds in the U.S. *International Journal of Business and Economic Studies*, 5(1), 31-48, Doi: https://doi.org/10.54821/uiecd.1258344

1. INTRODUCTION

Over the last years, an increasingly growing number of consumers seek products and services from companies which pay particular attention to the environmental and social footprint of their activities, as well as, to their governance practices. This trend does not concern only the consumer markets, but also refers to the investments in stocks, mutual funds, Exchange Traded Funds (ETFs) and other similar investing tools.[1]

"Responsible investing" means that an investor is no longer concerned solely about the financial return on their investments. On the contrary, a large body of investors is now interested in the environmental, social and governance aspects (ESG) of their investments.[2] The motivations of these investors vary. For instance, some investors are driven by their ethical, religious, environmental and social values. Other investors want to make an impact through their investments.[3] A third category of investors tries to exploit opportunities for returns relating to ESG risks. No matter what the motivation of each responsible investor is, nowadays ESG investment products, such as mutual funds and ETFs, have attracted trillions of dollars and they are expected to attract even more money in the near future.[4]

A significant issue with ESG investments is whether they are responsible indeed. In other words, the key question arising is whether mutual funds and ETFs (or others), which market themselves as being ESG compliant, do their best to adhere to the best ESG practices. The risk here is that such funds may claim that they do as much as they can to promote ESG practices, basically for marketing purposes, but, in fact, their actions indicate that they do not. This somehow misleading behavior has been called "greenwashing" (TerraChoice, 2007).

Greenwashing practices are not unique to investment companies. First of all, such behavior has been observed in consumer products and services. For instance, a company which is involved in the fashion industry may advertise itself as being ESG responsible, but, in reality, its manufacturing practices are far from being ESG compliant.[5] In stock investments, a mutual fund or an ETF, which presents itself as being ESG compliant, may invest in companies that have failed the ESG testing.

In any case, the consequences of greenwashing can be material. In this respect, TerraChoice (2007), notes that greenwashing in the consumer markets may mean that customers end up with inferior products from an ESG perspective. Moreover, in the competitive retail markets, a company applying greenwashing practices may gain market share at the expense of other companies which do not. Cynicism and doubt can be another issue. Cynicism and doubt entail that customers and investors believe that "they are all the same" and, consequently, every environmental claim must be false.

In this paper, we examine whether index funds in the United States apply some level of greenwashing. Two significant issues are assessed in this respect. The first one is whether index funds just track the S&P 500 Index, as it is often believed that they do so. The second issue concerns the level of index funds' exposure to the components of the S&P 500 Index, especially to those with poor ESG profiles.

There are several articles in the financial press which question the ESG compliance of index funds and ETFs. Sabrina Haumann from the "Cooler Future", examines whether three significant ESG ETFs traded in the U.S. are actually as green as they claim to be.[6] She finds that the examined ESG ETFs invest in stocks from the S&P 500 Index, which is not famous for their ESG practices. Steve Johnson from the *Financial Times* reports that ETFs tracking "low carbon", "climate change" or "Paris-aligned" indexes put little of their money into the greenest firms while increasing their exposure to firms with deteriorating ESG performance.[7] Tim Quinson from

[1] An exchange-traded fund (ETF) is a type of pooled investment security that operates much like a mutual fund. Typically, the majority of the existing ETFs worldwide track a particular index, sector, commodity, or other assets, but unlike mutual funds, ETFs can be purchased or sold on a stock exchange as a regular stock.

[2] In a similar context, the investors who invest in products that abide by the moral principles of Islam (the so-called Islamic Finance or 'Shari'ah-compliant' investments, support the idea that one shouldn't make money from money. This means that wherever possible, one should avoid getting involved in interest, i.e., return, neither by paying it nor by receiving it.

[3] Impact investing is a strategy that seeks to generate specific beneficial social or environmental effects along with financial gains. Impact investing can be implemented with numerous asset classes and may result in many specific outcomes. In any case, the point of impact investing is to use money and investment capital for positive social results. Investors who follow impact investing consider the commitment of a company to corporate social responsibility or the duty to positively serve society as a whole.

[4] According to *Forbes*, total assets invested in ESG funds are expected to exceed $50 trillion by 2025. Refer to https://www.forbes.com/advisor/investing/greenwashing-esg/.

[5] *Forbes* reports that the fashion brand H&M is currently being sued in the New York federal court for making false claims that its Conscious Collection is sustainable, while, in fact, the company uses more water to manufacture items in this collection than in its regular clothes.

[6] Refer to https://www.coolerfuture.com/blog/green-etf.

[7] Refer to https://www.ft.com/content/1587ee6d-e1da-489c-bee5-2199701c12a3.

Bloomberg notes that "*Many Big ESG Funds Are Just Glorified Market Trackers*".[8] All of the above could be indicative of greenwashing behavior on behalf of the particular ESG funds.

In addition, the *Economist* examined the 20 biggest ESG funds in the world and found that each of them held investments in fossil fuel producers, while others held stakes in oil producers, coal mining, gambling, alcohol and tobacco.[9] Similarly, Amenc et al. (2021) identify greenwashing risks in the construction of portfolios that represent popular climate strategies. Similar issues have been raised by InfluenceMap (2019 & 2021). These reports show that many funds remain intentionally invested in fossil fuel firms and are actively engaged with them to drive impact.

In this study, we examine the greenwashing issue with data from 27 ESG index funds traded in the United States. The study period spans from 1 August 2017 to 31 July 31 2022. From a methodological perspective, we employ a simple approach. First, we compute the correlations in returns between index funds and the S&P 500 Index. The betas of index funds with the S&P 500 Index are estimated, too. Correlations and betas will indicate the level of index funds' exposure to this index and verify (or not) whether ESG funds are just market trackers. For the controlling purposes, we compute correlations and betas with three alternative ESG indexes from the broad U.S. stock market. Then, we break down the holdings of each index fund in the sample to detect S&P 500 stocks with high or severe Morningstar ESG risk, as well as stocks which have attracted criticism for their ESG practices, such as Tesla and Amazon.com.

Our results reveal a strong correlation of the examined index funds with the S&P 500 Index. The average correlation in the sample is 0.90. In addition, the average beta with the S&P 500 Index approximates unity. These figures show that the average index fund in the sample tracks very closely the S&P 500 Index. This finding verifies the concerns that have been expressed in the financial press that, to a large extent, ESG funds are just market trackers. Furthermore, the analysis of index funds' holdings shows that about 26% of the examined funds (7 out of 27 funds) invest more than 5% of their assets in S&P 500 Index companies with severe or high ESG risk. In addition, five of the examined funds invest in companies which have attracted significant doubt about their ESG practices. Overall, our results indicate that, to some extent, the ESG index funds in the U.S. may be involved in some sort of greenwashing.

This study, which is one of the first studies in the field, has been motivated by the strong interest in ESG investment products over the last years, as well as the concerns that have been expressed in the financial press and the academia about the genuineness of the green claims made by ESG mutual funds and ETFs. We believe that our results contribute significantly to the existing literature. More specifically, the finding that about one-quarter of the examined index funds possibly apply greenwashing practices verifies the relevant concerns raised in the financial press and the academic literature. Therefore, based on our results, investors, and consumers in general, need to be skeptical about the green claims made by several providers of investment, as well as consuming, products. In other words, investors and consumers should not take for granted that a "green" product or a "green" investment or a "green" company always do as they say so, from an ESG perspective.

Moreover, our results justify the regulatory action that is currently being taken in the United States and abroad (and might trigger even more action) to identify companies that use ESG as a marketing ploy to exploit the best intentions of investors.[10] Finally, we believe that our study will induce other researchers to evaluate the greenwashing practices in the ESG funds industry, using bigger samples and covering a wider spectrum of countries and regions.

The remainder of this article is structured as follows: Section 2 offers the literature review. Section 3 describes the sample of the study. Section 4 provides the ESG profiles of index funds in the sample. Section 5 discusses the correlations and the systematic risk of ESG index funds with the S&P 500 Index and the three alternative ESG market indexes considered. The analysis of index funds' holdings is provided in Section 6. Conclusions are offered in Section 7.

[8]Refer to: https://www.bloomberg.com/news/newsletters/2022-02-02/many-big-esg-funds-are-just-glorified-market-trackers?utm_medium=cpc_search&utm_campaign.

[9] Refer to https://www.economist.com/leaders/2021/05/22/sustainable-finance-is-rife-with-greenwash-time-for-more-disclosure.

[10] For instance, the Securities and Exchange Commission (SEC) in the US recently closed a comment period on two proposed rules (17 CFR Parts 232, 270 and 274 - Release No. IC-34593; File No. S7-16-22) that would specifically tackle the greenwashing issue. The proposals would create consistent standards, such as enhanced disclosures to shareholders. The SEC has also created an ESG enforcement task force to identify violations in disclosure and compliance related to ESG funds. Please, refer to https://www.forbes.com/advisor/investing/greenwashing-esg/.

2. LITERATURE REVIEW

Several studies have accentuated the so-called "Six Sins of Greenwashing" [e.g., TerraChoice (2007) and Dimitrieska et al. (2017)]. The first sin is that of the "hidden trade-off", which is committed when a product is considered to be green based on just one or a few of its attributes, while other, possibly more, important environmental attributes of the product are neglected. The second sin is that of "no proof", which means than an environmental claim cannot be verified by easily accessible supporting information. The third sin is that of "vagueness". This sin is committed when poorly defined or extremely broad environmental claims are made. The fourth sin is that of "irrelevance", which is committed when real but unimportant environmental claims are made. The fifth sin is that of the "lesser of two evils". This sin means that true green claims are made about a product which, however, may distract the consumers from the greater environmental risks relating to the product's category as a whole (e.g., organic cigarettes). The last sin of greenwashing is that of "fibbing", which is committed when false environmental claims are made.

In the financial sector, Mahtani et al. (2018) from Deutsche Bank combined ESG issues and artificial intelligence to form an investment strategy (a new α-Dig system), which is able to identify positive ESG indicators in news articles and reports, such as the words "settlement" and "resolve". The models show that companies with these ESG indicators outperform the broader European index by two percentage points within six months. The tool developed by Deutsche Bank can also help in the detection of greenwashers, by applying machine learning, algorithms and natural language processing techniques to assess information about carbon-related issues released from companies which may be indicative of greenwashing. The research team concludes that their tool is quite significant for making a prediction of the likelihood that a company would fulfill its sustainability promises in the next year given its prior year's sustainability report.

According to the Universal Owner (2021) Vanguard, which is the second-largest asset manager in the world, claimed that its investment strategy would stick to the Sustainable Development Goals for the protection of the planet that have been adopted by the United Nations. However, in reality, Universal Owner notes that Vanguard still holds stakes in fossil fuel companies whose revenue, to a large extent, is made from thermal coals and tar sands. Based on this observation, the ESG funds of Vanguard cannot be considered to be at the forefront of a move toward decarbonization. On the contrary, they seem to be good examples of greenwashing.

Amenc et al. (2021) show that stylized equity strategies which are constructed with the use of firm-level emissions data, fail to deliver consistency with ESG impact objectives. As a result, institutional fund portfolios representing popular climate strategies, especially those that correspond to net-zero alignment strategies, are not free from greenwashing risks, largely because they exhibit attractive climate metrics at the portfolio level through implementing flawed construction strategies. Unfortunately, it seems that the investment industry, despite its claims, does little to direct capital to companies that do their best to assist the climate transition.

Yi Li et al. (2022) employ natural language processing (NLP) to extract common definitions to create a list of words or phrases that accurately define ESG funds. The effort of the study is to help eliminate misleading marketing, fund naming, and prospectus language in mutual funds and ETFs. The study concluded that the linguistic patterns found in mutual fund and ETF prospectus language have a relatively low correlation with the ESG rating of the funds and that one cannot tell the difference between a prospectus for true ESG vs. greenwashing mutual funds and ETFs. In fact, ESG funds hold dozens of fossil fuel extraction companies and coal-fired utilities.

Contrary to the above findings, Curtis et al. (2021), try to address concerns that ESG funds present distinctive regulatory concerns in comparison to the mutual fund market as a whole, either because they are not doing what they are supposed to do, or because their financial performance is inferior to that of the non-ESG funds. In doing so, they provide evidence that ESG funds do offer investors something different from traditional funds, in terms of portfolio construction and voting. In fact, they do so without causing investors systematically to sacrifice economic performance.

Finally, Clements (2022) claims that greenwashing in the ESG ETFs is less of a problem relative to the issue of "comparability". The author emphasizes that there is limited evidence that greenwashing is widespread in ESG

ETFs and notes that the avoidance of extensive greenwashing practices is due to the reputational costs involved and the competition among ESG ETFs to attract the new ESG-directed capital flows.

3. METHODOLOGY, HYPOTHESES DEVELOPMENT AND SAMPLE

3.1. Correlation and Systematic Risk Analysis

In this section, we first assess the correlation of ESG index funds with the S&P 500 Index, which has been chosen as a proxy for the entire stock market in the U.S. This index is chosen as the main benchmark in our correlation analysis because this is a widely used benchmark in numerous studies in the financial literature that compare the performance (or other features) of stocks, mutual funds, ETFs and other investments in the US to the broad market index. The main hypotheses of our analysis are expressed as follows:

H_0: There is no relationship between ESG funds and the S&P 500 Index.

H_1: There is a relationship between ESG funds and the S&P 500 Index.

As far as the components of the S&P 500 Index are concerned, the index holds 7 companies with severe Morningstar ESG risk and 53 companies with high scores of this risk.[11] In our analysis, we assume that an ESG index fund should avoid investing in stocks with high or severe ESG risk scores despite their financial prospects. When an index fund does invest in such companies, while promoting itself as being ESG compliant, we may infer that this fund possibly applies some sort of greenwashing.

For the controlling purposes, we compute correlations between the returns of index funds and those of three alternative ESG indexes covering the broad stock market in the U.S. These indexes are the MSCI USA ESG Select Index,[12] the S&P 500 ESG Index,[13] and the S&P United States LargeMidCap ESG Index.[14] We use these three ESG indexes assuming that an ESG index fund, due to its nature, should be more correlated with such an index rather than the S&P 500 Index. If the opposite is the case, we may conclude that some level of greenwashing is the case in the market of index funds.

In addition to the correlation analysis, we use OLS time series regression analysis to estimate the systematic risk, i.e., betas, of each index fund with the S&P 500 Index and the ESG indexes considered in our study.

3.2. Holdings Analysis

In this section, we perform an assets-based comparative analysis of ESG index funds' holdings against the components of the S&P 500 Index in order to detect stocks of this index with high or severe Morningstar ESG risk scores that are held by the ESG index funds. If such stocks are held by an ESG fund, we may infer that this fund adopts some sort of greenwashing practices.

3.3. The Sample

The sample of the study is described in this section. Our sample includes 27 ESG index funds that are traded in the U.S.. The total number of the U.S. ESG index funds is significantly higher than that in our sample. More

[11] We have found the Morningstar ESG Risk Score of each company in the S&P 500 Index on www.sustainalytics.com/investor-solutions/analytic-reporting-solutions/morningstar-sustainability-rating-for-funds. Indicatively, companies in the S&P 500 Index with severe ESG risk score are the General Electric Company and the Marathon Oil Corporation and companies with high ESG risk scores are the Exxon Mobil Corporation, the Boeing Company, the Chevron Corporation, and the Amazon Company.

[12] The MSCI USA ESG Select Index targets companies with positive ESG factors. It aims to maximize its exposure to ESG factors, subject to an expected tracking error of 1.8% and other constraints. It is designed to over-weight companies with high ESG ratings and under-weight companies with low ratings. Tobacco and controversial weapons companies, as well as major producers of alcohol, gambling, firearms, military weapons and nuclear power, are not eligible for inclusion in this index. The index was launched on 01 September 2010. The prices of this index have been found on the Bloomberg database.

[13] The S&P 500 ESG Index is a broad-based, market-cap weighted index that is designed to measure the performance of securities meeting sustainability criteria, while maintaining similar overall industry group weights as the S&P 500. The index excludes companies with disqualifying UN Global Compact scores and business involvement in tobacco, controversial weapons and thermal coal. The index was launched in January 2019 and has 319 constituents, which translates to around 38% exclusions from the parent index. Prices over the entire five-year study period before the launch of the index are computed by the index provider with hypothetical back-tested data and found on the Bloomberg database.

[14] The S&P United States LargeMidCap ESG Index is a broad-based, market-cap-weighted index that is designed to measure the performance of securities meeting sustainability criteria, while maintaining similar industry group weights as the S&P United States LargeMidCap Index. The index was launched on 06 May 2019. Prices over the entire five-year study period before the launch of the index are computed by the index provider with hypothetical back-tested data and found on the Bloomberg database.

specifically, according to the Forum for Sustainable and Responsible Investments in the United States (USSIF), there are 185 responsible funds that are offered by its institutional member firms.[15] These funds cover a wide spectrum of investments from domestic and international equity of various capitalization levels, fixed income and balanced choices, i.e., a mixture of equities and fixed income securities. The total assets under managed by these 185 funds as of 31 July 2022, approximated 116 billion dollars.

In our analysis, we focus solely on domestic equity index funds and cover a five-year period spanning from 1 August 2017 to 31 July 2022, to have sufficient data for our tests. By excluding fixed income, balanced and international choices, we remained we 58 index funds, many of which are offered in multiple shares. From funds with multiple shares, we chose the one with the longest history, i.e., with the oldest inception. All the applied selection criteria resulted in 27 index funds making the cut.

However, despite the relatively small number of funds that will be covered by our study, we deem that our sample is quite representative of the entire market of the 185 index funds mentioned above. We deem so because the sum of assets managed by these 27 index funds as of 31 July 2022, amounted to 67 billion dollars, or else, 58% of total assets held by ESG index funds at that date. This percentage indicates that, actually, our sample is sufficient enough for the purposes of our analysis.

Table 1 presents the profiles of ESG index funds, which include their ticker, name, type, inception month, assets under management as of 31/07/2022, management fee, and the average return over one year, three years and five years during the study period.[16]

In regard to type, the majority of index funds (18 out of 27 funds) are focused on large-cap stocks. When it comes to the trading history of the selected funds, the Parnassus Mid Cap Growth Fund (PARNX) is the oldest one (it was launched at the end of 1984). On the other hand, the Pax ESG Beta Dividend Fund (PAXDX) and the Pax Large Cap Fund (PAXLX) are the youngest, with about 5.5 years in the market. In addition, 11 funds were launched in the ’80s and the ’90s. This element could be indicative of an early interest in ESG investments about 30 or 40 years ago. However, it could be the result of an index fund changing its investment target to being ESG compliant after its initial launch many years ago.

With respect to assets, the average ESG index fund in the sample held about 2.5 billion dollars at the end of July 2022. This is a relatively big number. However, the median term of assets under management amounts to 644 million dollars, showing that most of the index funds in the sample hold significantly lower assets than the average term. The biggest index fund in the sample is the Parnassus Core Equity Fund (RPBLX), which has been around for about 30 years. This fund invests in large-cap stocks and at the end of July 2022 held about 27 billion dollars. The smallest fund in the sample is the Trillium Small/Mid Cap Mutual Fund (TSMDX), whose assets under management in July 2022 amounted to just 36 million dollars. This is a relatively young fund which invests in medium and small-cap stocks.

As far as management fees are concerned, Table 1 reports a respective average ratio of 0.60%. This percentage is lower in comparison to those of the traditional actively open-ended mutual funds. However, this average management fee is quite higher than that of the corresponding ESG ETFs.[17] The lowest management fee in the sample is 0.20% and it is charged by the Domini Social Equity Fund (DSEFX). This fund was launched in June 1991. The maximum management fee in the sample is very big at 2%, charged by the Aspiration Redwood Fund (REDWX), one of the youngest funds in the sample.[18]

Finally, when it comes to performance, all the ESG index funds in the sample present negative average returns over the last year of the study period, following the entire stock market which has been severely affected by Ukraine’s invasion by Russia, ensued energy crisis, and the inflation levels worldwide which rocketed in 2022.[19] However, the medium-term and the long-term returns of the examined index funds in the three-year and five-year periods as of 31 July 31 2022, are positive, with average terms approximating 11% for both periods. A last note

[15] Many of these 185 funds are offered in multiple shares, i.e., institutional, investors, etc., and are counted twice, thrice, and so on, in the total number of the existing ESG index funds in the U.S.. Refer to https://charts.ussif.org/mfpc/?.
[16] Tickers, names, types, inception months, management fees and returns have been found on https://charts.ussif.org/mfpc/?.
[17] In an unpublished study of ours, we have seen that the average expense ratio of ESG ETFs in the U.S. is 0.28%, being quite lower than that of the index funds examined in the current study.
[18] The fact that the youngest fund charges the highest management fees and vice versa is in line with the findings of the literature on mutual funds which show that there is a negative relationship between the age of a fund and the costs it charges investors with. In fact, we run a simple cross-sectional regression of index funds management fees on their age as of 31 July 2022 and we obtained a negative slope, which however is statistically insignificant.
[19] The S&P 500 Index lost about 14% of its value during the period 8/1/2021-7/31/2022.

about returns is that there is a wide dispersion in the sample with extreme return records ranging from 3.1% to 16.7% in the three-year period and from 5.2% to 17.2% in the five-year period.

Table 2 presents the benchmarks of the examined ESG index funds and provides information on the approach followed by each fund towards meeting the desired ESG criteria, especially with respect to investments in "sensitive" sectors such as alcohol, animal welfare, defense weapons, gambling and tobacco. Based on the focus of each index fund, companies that are frequently excluded are those operating in sectors such as adult entertainment, alcohol, tobacco, cannabis, gambling, chemical and biological weapons, cluster munitions, anti-personnel landmines, nuclear weapons, conventional military weapons, civilian firearms, nuclear power, and coal, oil, or gas. However, these sectors are not banned by all index funds.

The combination of the differences in historical returns and the variations in the ESG approach undertaken by each fund entails that all ESG index funds are not similar to each other, both from an ESG and a financial perspective. Therefore, concerned investors should be very careful when choosing among ESG products and focus on funds that serve their investment purposes.

3.4. ESG Profile of Index Funds

The ESG profiles of the examined index funds as of 31/07/2022 are provided in Table 3. Profiles include the Morningstar metrics of ESG Risk Score, Carbon Risk Score and Fossil Fuel Involvement. The ESG risk scores range from Negligible (0.00-9.99), to Low (10.00-19.99), Medium (20.00-29.99), High (30.00-39.99), and Severe (40.00 or above). The carbon risk score is a number between 0 and 100, with the less score being the better in ESG terms. This score is computed as the asset-weighted sum of the carbon risk scores of the fund's holdings, averaged over the trailing 12 months. Finally, the fossil fuel Involvement is a fund's asset-weighted percentage exposure to fossil fuels, averaged over the trailing 12 months.[20]

The average (median) Morningstar ESG Risk Score in the sample is 20.30 (19.96). In addition, 12 index funds present low ESG risk scores and the rest 15 funds have medium ESG risk scores. When it comes to carbon risk, the average and median terms are low at 5.75 and 5.23, respectively. In addition, there is no individual fund whose carbon exceeds 10. In regard to fossil fuel involvement, the average (median) percentage is 2.5% (0.8%). In addition, about half of the funds (13 out of 27) present fossil fuel involvement figures that are lower than 1% (six funds present nil fossil fuel involvement). On the other hand, there are two index funds whose fossil fuel involvement exceeds 10%, with the highest being equal to 18.2%.

Overall, the data in Table 3 indicate a rather mediocre ESG performance on behalf of the examined index funds. More than half of them are awarded medium ESG risk scores by Morningstar. Their carbon risk is low, but it is not nil. This is also the case for their fossil fuel involvement. To our view, the Morningstar ESG risk metrics could be indicative of some level of greenwashing committed by some of the examined index funds.

4. EMPIRICAL RESULTS

4.1. Correlation and Systematic Risk Analysis

The correlations between the returns of ESG index funds and the return of the S&P 500 Index are presented in Table 4. To avoid issues of noise that are frequently observed when using daily data, we also compute correlations with weekly returns too.[21] The average correlation in daily returns is 0.90. In addition, 18 funds have correlations with the S&P 500 Index of 0.90 or higher, while the lowest correlation in the sample is 0.65. The correlations obtained with weekly data are similar.

In sum, both the daily and weekly correlations indicate that the examined index funds follow very closely the S&P 500 Index as if they were supposed to track it. According to experts writing in the financial press, being closely invested in the S&P 500 Index is not that good for a fund from an ESG perspective. In any case, following the S&P 500 Index the way the index funds in our sample do may be indicative of some greenwashing on behalf of these funds.

[20] The Morningstar ESG metrics and methodological details have been found on www.morningstar.com.
[21] The returns of index funds and the S&P 500 Index have been computed in percentage terms with close prices found on www.nasdaq.com.

The correlations of index funds' daily and weekly returns with the ESG indexes are essentially equal to those obtained for the S&P 500 Index. The differences in correlations among the four indexes considered, if any, do not exceed one basis point (bps). This element may entail that the "constructors" of the ESG indexes in the U.S. do not do their best to differentiate their ESG benchmarks from the broad market index. In other words, we may conclude that investing in the ESG index funds or in the S&P 500 Index itself is actually the same thing. If this inference is true, then it may be considered that some of the examined index funds apply greenwashing.

This inference is further supported by the estimates of index funds' betas with the S&P 500 Index found in Table 5.[22] We point out that in passively managed mutual funds and ETFs, beta can be used as a tool for assessing the degree of a fund's replication of an index. In particular, a beta of 1 indicates a full replication of the underlying index.

The results in Table 5 are very supportive of the idea of a close tracking of the S&P 500 Index by the examined index funds. The average beta obtained for the daily (weekly) returns is 0.97 (1.00). The lowest daily and weekly betas in the sample with the S&P 500 Index are 0.84 and 0.83, respectively. The highest are 1.10 and 1.22. In addition, while the majority of individual betas (either those estimated with daily returns or those obtained via using weekly returns) are statistically significantly different from unity, the differences are not that material from an economic perspective (not exceeding 5 bps in many cases).

Overall, the analysis of index funds' betas with the S&P 500 Index indicates a high level of correlation between them, as shown through the correlation analysis above. Based on our results, the criticism of the ESG funds by the financial press and the academia that they just track the S&P 500 Index cannot be considered unjustified. In fact, it seems that the ESG index funds in the U.S. are highly aligned with the performance of the S&P 500 Index.

As we did with correlations, we estimate the betas of ESG index funds with the three alternative ESG indexes used in our analysis for controlling purposes. Following the patterns in correlations, betas with those indexes are not significantly different from those obtained for the S&P 500 Index. Therefore, once again, the high resemblance between the S&P 500 Index and the three ESG indexes is verified. Consequently, the inference about some level of greenwashing on behalf of index funds is verified too.

4.2. Holdings Analysis

The outcomes of the holdings' analysis are reported in Table 6. The table shows the portion of each index fund's holdings of stocks with severe, high, medium, low and negligible ESG Morningstar risk, along with the portion of the non-S&P 500 Index assets held by each ETF.[23]

With respect to the severe ESG risk, the exposure of the examined index funds to such stocks is rather immaterial. The average exposure in the sample is just 0.15%. In addition, there are only two funds (the Amana Growth Fund-AMAGX and the Calvert U.S. Large Cap Value Responsible Index Fund-CFJAX),[24] whose exposure to stocks from the S&P 500 Index with severe ESG risk exceeds 1% (2.06% at a maximum). Moreover, 21 funds hold no stocks with severe ESG risk.

When it comes to the exposure to high ESG risk, the analysis indicates that the examined index funds do not totally refrain from such stocks. In particular, the average weighting of the S&P 500 Index stocks with high risk is 3.37%, which is not that big. However, there are six funds in the sample which invest 5% of their assets or more in stocks with high ESG risk. One of them (the Amana Growth Fund-AMAGX) also invests 2.06% of its assets in stock with severe ESG risk. The highest exposure to stocks with high risk is 11.03% (shown by the Amana Income Fund-AMANX).

Combining the exposures to stocks with severe and high ESG risk results in seven index funds (or 26% of the

[22] Betas are estimated with a simple time-series regression model via which the daily (or the weekly) return of each index fund is regressed on the corresponding return of the market index.
[23] It should be noted that in 13 cases, the components of index fund's portfolio are not fully disclosed publicly. The portion of the non-disclosed stocks is noted in the "Unknown" column of Table 6.
[24] The top-five holdings of AMAGX are Apple (10.11%), Intuit (5.7%), ASML Holding NY (4.82%), Adobe (3.82%), and Estee Lauder (3.72%). The top-five holdings of CFJAX are JPMorgan Chase (2.78%), Bank of America (2.03%), Verizon Communications (1.67%), Walmart (1.48%), and Wells Fargo (1.46%).

entire sample) investing 5% of their assets or more in stocks with poor ESG profiles.[25] This finding may indicate that the index funds, which are exposed to stocks from the S&P 500 Index with severe and high ESG risk but classify themselves as being ESG compliant, employ some sort of greenwashing.

As further testing of the possible negligence on behalf of some ESG index funds with respect to their duty to seek companies with the best ESG practices, we examine whether these funds are exposed to well-known companies which have received criticism about their ESG practices. The companies considered are Tesla, Inc. and Amazon.com. The first one was ineligible for inclusion in the S&P 500 ESG Index, during the rebalancing of the index at the end of April 2022, due to its low S&P DJI ESG score relative to its global industry group peers.[26] The second has been recently included in the "Dirty Dozen" list of the most dangerous employers in the U.S. by the National Council on Occupational Safety and Health even though it was among the first companies to announce plans to reduce their emissions to zero by 2050.[27]

As we see in Table 6, 5 out of the 27 index funds in the sample invest in Tesla or Amazon or both. This means that about one-fifth of the examined ESG funds are in some breach of their ESG goals. This choice may be justified from a financial perspective. However, most ESG investors would probably feel more comfortable if the managers of their funds are more concerned about adhering to the best ESG principles and choosing companies with ESG profiles of undoubtedly high standards.

Overall, it seems rather weird that an ESG index fund cannot avoid investing in companies with malpractices from an ESG perspective. To our view, an index fund that claims that it abides by ESG principles should refrain itself from investing in companies with poor ESG performance. According to the results of the holdings' analysis, this is not the case for several index funds in our sample. These results verify the inferences that we have already reached through the correlation and systematic risk analyses in the previous section, that is, to some extent, the ESG index funds in the United States are possibly involved in greenwashing practices.

5. CONCLUSION

This paper examines whether the ESG index funds in the U.S. apply greenwashing practices. Greenwashing refers to funds or companies that promote themselves as being ESG compliant but, in reality, they do not do their best to meet their green promises. In mutual funds, greenwashing translates into investing in companies with poor ESG performance. In our study, we use a sample of 27 index funds and cover a period spanning from 1 August 2017 to 31 July 2022. The sample represents 58% of total assets held by the institutional member firms of the Forum for the Sustainable and Responsible Investments in the U.S. at the end of July 2022. Our examination of greenwashing includes correlation and systematic risk analyses of index funds with the S&P 500 Index and three alternative ESG indexes. In addition, the holdings of each ESG index fund are scanned against the components of the S&P 500 Index to detect stocks of this index with severe or high Morningstar ESG risk scores that are held by the ESG index funds.

The results reveal a very high correlation in returns between ESG index funds and the S&P 500 Index, as well as with the alternative ESG indexes used for controlling purposes. The differences in correlations among the four market indexes used are essentially nil, indicating that those who construct the ESG indexes, to a large extent, just follow the S&P 500 Index.

This inference is further verified by the estimations of the systematic risk of index funds with the S&P 500 Index and the other three indexes. On average, betas approximate unity, implying a rather full replication of the S&P 500 Index on behalf of the examined index funds. These results are in line with the concerns expressed in the

[25] This sum could be bigger if we were able to search among the portion of the undisclosed stocks held by 13 funds in our sample.
[26] Margaret Dorn from the S&P Dow Jones Indices provides explanations on why Tesla, Inc. has been banned from the S&P 500 ESG Index. In particular, the S&P DJI ESG Score of Tesla has deteriorated due to its lack of low carbon strategy and codes of business conduct. In addition, claims of racial discrimination and poor working conditions at Tesla's Fremont factory have been made. Tesla has received further criticism for its handling of the NHTSA investigation after multiple deaths and injuries were linked to its autopilot vehicles. Refer to: https://www.indexologyblog.com/2022/05/17/the-rebalancing-act-of-the-sp-500-esg-index/.
[27] Refer to https://www.cnbc.com/2021/08/29/amazons-biggest-hardest-to-solve-esg-issue-may-be-its-own-workers.html.

financial press that ESG funds are just market trackers.

Our findings entail that, to some degree, following ESG indexes is not different from following the S&P 500 Index. If this is really the case, the ESG index funds that adopt such investment practices possibly apply some sort of greenwashing. This conclusion is also confirmed via analyzing the holdings of the ESG index funds. The analysis revealed that several funds hold 5% of their assets or more in S&P 500 Index stocks with severe and high ESG risk profiles. In addition, some of them invest in companies which are not famous for their ESG practices (such as Tesla, Inc. and Amazon.com).

Overall, all the tests we applied revealed that the ESG index funds in the U.S. do not fully abide by the ESG principles as they should do. On the contrary, it seems that some greenwashing is the case in the ESG index funds industry in the U.S. This fact entails that the ESG-concerned investors may end up with investments which do not meet their criteria for responsible investing. Therefore, investors should be careful when forming their investing choices, while more regulatory control may be needed.

The research on greenwashing practices by ESG funds can be expanded in several ways. The fixed income niche of the market could be examined, as well as the equity segment with an international focus. The analysis could also include alternative ESG metrics, such as those of MSCI, as well as ETFs and other ESG investment products. However, it could probably be more interesting to implement a comparative analysis of the ESG compliance in the fund industry between Europe and the United States. This comparison would be of particular interest due to the stronger regulatory action undertaken in Europe relative to the U.S. In addition, for just one of the few times in the history of stock markets, Europe and not the U.S. leads the global ESG market. Due to this element, a comparison between the two continents is highly desired.

AUTHORS' DECLARATION

This paper complies with Research and Publication Ethics, has no conflict of interest to declare, and has received no financial support.

AUTHORS' CONTRIBUTIONS

All sections are written by the author.

REFERENCES

Amenc, N., Goltz, F., & Liu, V. (2022). Doing good or feeling good? Detecting greenwashing in climate investing. *The Journal of Impact and ESG Investing*. available on https://www.edhec.edu/sites/www.edhec-portail.pprod.net/files/210921-1_doing_good_or_feeling_good.pdf, accessed on 8/5/2022.

Clements, R. (2021). Why comparability is a greater problem than greenwashing in ESG ETFs. *William & Mary Business Law Review*, *13*, 441.

Curtis, Q., Fisch, J., & Robertson, A. Z. (2021). Do ESG mutual funds deliver on their promises?. *Michigan Law Review*, *120*, 393.

Dimitrieska, S., Stankovska, A., & Efremova, T. (2017). The Six sins of greenwashing. *Economics and Management*, *13*(2), 82-89.

InfluenceMap, (2019). Climate Funds and Fossil Fuels. available on https://influencemap.org, accessed on 8/6/2022.

InfluenceMap, (2021). Climate Funds: Are They Paris Aligned?". available on https://influencemap.org, accessed on 8/6/2022.

Yi Li, M., Zheng, O., Hsu, H.C., and Zhu, Y. (2022). Identify “Greenwashing” funds using NLP in firms’ prospectuses. *University of California, San Diego,* available on https://static1.squarespace.com/static/59a706d4f5e2319b70240ef9/t/61d61aa3e8c5f17dc68eb7b7/1641421477662/As+You+Sow-UCSD_ESG+Fund+Naming_Final+Report_20211208.pdf, accessed on 9/16/2022.

Mahtani, S., Reid, J., and Templeman, l. (2018). Big data shakes up ESG investing. *Deutsche Bank Research,* available on https://www.dbresearch.com/PROD/RPS_EN-PROD/PROD0000000000478852/Big_data_shakes_up_ESG_investing.pdf?undefined&realload=hn066XgwglwRDfqhqg7iT8HUXPOt1vhs5JqZUFbBEUn8bUKPZwS~nl6RkACOK2kS, accessed on 9/16/2022.

TerraChoice, T. (2007). The Six Sins of Greenwashing. A study of environmental claims in North American Consumer Markets. available on https://www.academia.edu, accessed 8/6/2022.

Universal Owner, (2021). “Vanguard and universal ownership. available on https://aae3a3a4-223a-4abf-a8f5-690b8f339311.filesusr.com/ugd/4e1fd6_6239fbdb9a384892889efaf1e610e6e4.pdf, accessed on 9/16/2022.

APPENDIX

Table 1. Profiles of the Index Funds

Ticker	Name	Type	Inception	AUM ($M) @ 7/31/222	Managemet Fee (%)	1 yr Avg %	3 yr Avg %	5 yr Avg %
AMAGX	Amana Growth Fund	Large Cap	Feb, 1994	3,238	0.67	-7.86	16.74	17.23
AMANX	Amana Income Fund	Large Cap	June, 1986	1,547	0.76	-1.24	12.03	10.96
REDWX	Aspiration Redwood Fund	Large Cap	Nov, 2015	136	2.00	-7.56	10.86	10.91
CSIEX	Calvert Equity Fund	Large Cap	Aug, 1987	5,856	0.55	-6.61	13.87	16.68
CSXAX	Calvert U.S. Large Cap Core Responsible Index Fund	Large Cap	June, 2000	4,117	0.24	-9.43	13.05	12.76
CGJAX	Calvert U.S. Large Cap Growth Responsible Index Fund	Large Cap	June, 2015	388	0.24	-11.21	15.91	16.03
CFJAX	Calvert U.S. Large Cap Value Responsible Index Fund	Large Cap	June, 2015	1,778	0.24	-6.62	9.23	8.49
DSEFX	Domini Social Equity Fund	Large Cap	June, 1991	917	0.20	-12.65	12.46	10.77
GCEQX	Green Century Equity	Large Cap	June, 1991	515	0.25	-8.64	12.82	12.45
NBSRX	Neuberger Berman Socially Resp	Large Cap	Mar, 1994	1,501	0.47	-8.77	11.19	9.91
PRBLX	Parnassus Core Equity Fund	Large Cap	Aug, 1992	26,956	0.57	-7.52	12.43	13.27
PARWX	Parnassus Endeavor Fund	Large Cap	Apr, 2005	4,756	0.66	-9.24	16.47	12.52
PAXDX	Pax ESG Beta Dividend Fund	Large Cap	Dec, 2016	104	0.65	-5.96	9.00	9.87
PXWGX	Pax ESG Beta Quality Fund	Large Cap	June, 1997	285	0.63	-6.22	11.41	11.34
PAXLX	Pax Large Cap Fund	Large Cap	Dec, 2016	1,421	0.65	-7.21	16.15	14.45
MGNDX	Praxis Growth Index Fund	Large Cap	Apr, 2007	510	0.25	-9.30	15.49	15.44
MVIAX	Praxis Value Index	Large Cap	Apr, 2011	384	0.25	-2.48	9.24	9.19
WSEFX	Walden Equity Fund	Large Cap	June, 1999	247	0.75	-4.55	11.85	12.77
CCAFX	Calvert Mid Cap Fund	Mid-Sm Cap	Oct, 1994	277	0.77	-12.03	4.64	7.50
CCVAX	Calvert Small Cap Fund	Mid-Sm Cap	Sep, 2004	2,783	0.80	-6.63	7.03	9.07
PARMX	Parnassus Mid Cap Fund	Mid-Sm Cap	Apr, 2005	7,174	0.70	-10.72	6.00	7.77
PARNX	Parnassus Mid Cap Growth Fund	Mid-Sm Cap	Dec, 1984	781	0.61	-26.44	3.10	5.21
PXSCX	Pax Small Cap Fund	Mid-Sm Cap	Mar, 2008	644	0.75	-14.79	7.25	5.56
MMSCX	Praxis Small Cap Fund	Mid-Sm Cap	Apr, 2007	160	0.30	-10.15	8.57	7.57
TSMDX	Trillium Small/Mid Cap Mutual Fund	Mid-Sm Cap	Aug, 2015	36	0.75	-9.62	9.08	8.08
WAMFX	Walden Midcap Fund	Mid-Sm Cap	July, 2011	100	0.75	-1.82	9.22	10.96
WASMX	Walden SMID Cap Innovations Fund	Mid-Sm Cap	June, 2012	114	0.75	-2.85	9.55	10.45
Average				**2,471**	**0.60**	**-8.45**	**10.91**	**11.01**
Median				**644**	**0.65**	**-7.86**	**11.19**	**10.91**
Min				**36**	**0.20**	**-26.44**	**3.10**	**5.21**
Max				**26,956**	**2.00**	**-1.24**	**16.74**	**17.23**
Data Source: SIF - The Forum for Sustainable and Responsible Investments (https://charts.ussif.org/mfpc/?).								

Note: This table presents the profiles of ESG Index Funds, which include their ticker, name, type, inception month, assets under management (AUM) as of 31 July 2022, the management fee , and the average return over one, three and five years (during the period 1 August 2017 to 31 July 2022).

Table 2. Benchmarks of Index Funds

Ticker	Benchmark Name	ESG Approach
AMAGX	S&P 500 Composite Total Return	It applies business sector and ESG screens to eliminate companies primarily involved in certain activities including interest, gambling, pork, fossil fuel extraction, alcohol, tobacco, pornography and weapons.
AMANX	S&P 500 Composite Total Return	It applies Business sector and ESG screens to eliminate companies primarily involved in certain activities including interest, gambling, pork, fossil fuel extraction, alcohol, tobacco, pornography and weapons.
REDWX	S&P 500 Composite Total Return	It seeks to identify material Key Performance Indicators (KPIs) that are industry specific, and can be indicators of superior sustainability performance (68 sustainability factors across 21 industries).
CSIEX	S&P 500 Composite Total Return	Sectors of restricted/exclusionary investment are those of alcohol, animal welfare, defense weapons, gambling and tobacco.
CSXAX	Calvert U.S. Large Cap Core Responsible Index	Sectors of restricted/exclusionary investment are those of alcohol, animal welfare, defense weapons, gambling and tobacco.
CGJAX	Calvert U.S. Large Cap Growth Responsible Index	Sectors of restricted/exclusionary investment are those of alcohol, animal welfare, defense weapons, gambling and tobacco.
CFJAX	Calvert U.S. Large Cap Value Responsible Index	Sectors of restricted/exclusionary investment are those of alcohol, animal welfare, defense weapons, gambling and tobacco.
DSEFX	S&P 500 Composite Total Return	It focuses on universal human dignity and environmental sustainability and seeks to avoid investment in companies that are the worst contributors to climate change, and to include companies with strong energy efficiency measures or that offer climate solutions. It also engages directly with our holdings on a range of climate change issues.
GCEQX	S&P 500 Composite Total Return	It is fossil fuel-free, low-carbon investment option that avoids carbon-intensive companies. It does not invest in companies that explore for, extract, produce, manufacture or refine coal, oil or gas or produce or transmit electricity derived from fossil fuels or transmit natural gas or have material carbon reserves.
NBSRX	S&P 500 Composite Total Return	The management team simultaneously performs ESG research to identify companies with leadership criteria in areas of environmental impact, workplace practices, community relations, supply chain and product integrity.
PRBLX	S&P 500 Composite Total Return	Sectors of restricted/exclusionary investment are those of alcohol, animal welfare, defense weapons, gambling and tobacco. It also avoids investing in companies that derive significant revenue from business with Sudan.
PARWX	Russell 1000 Value Index	Sectors of restricted/exclusionary investment are those of alcohol, animal welfare, defense weapons, gambling and tobacco. It also avoids investing in companies that derive significant revenue from business with Sudan.
PAXDX	Russell 1000	Combination of positive and restricted/exclusionary strategies in alcohol and animal welfare. No investment in tobacco and defense weapons.
PXWGX	Russell 1000	Combination of positive and restricted/exclusionary strategies in alcohol, animal welfare and gambling. No investment in tobacco and defense weapons.
PAXLX	S&P 500 Composite Total Return	Restricted/exclusionary strategies in animal welfare. No investment in alcohol, gambling, tobacco and defense weapons.
MGNDX	MSCI U.S. Prime Market Growth Index	Restricted/exclusionary strategies in animal welfare. No investment in alcohol, gambling, tobacco and defense weapons.
MVIAX	MSCI US Prime Market Value Index	Restricted/exclusionary strategies in animal welfare. No investment in alcohol, gambling, tobacco and defense weapons.
WSEFX	S&P 500 Composite Total Return	Sectors of restricted/exclusionary investment are those of alcohol, animal welfare, defense weapons, gambling and tobacco.
CCAFX	Russell Mid Cap Growth	Sectors of restricted/exclusionary investment are those of alcohol, animal welfare, defense weapons, gambling and tobacco.
CCVAX	Russell 2000 Value	Sectors of restricted/exclusionary investment are those of alcohol, animal welfare, defense weapons, gambling and tobacco.

PARMX	Russell Midcap Index	Restricted/exclusionary investments in alcohol, defense weapons, gambling and tobacco. Positive investment in animal welfare.
PARNX	Russell Mid Cap Growth	Restricted/exclusionary investments in alcohol, defense weapons, gambling and tobacco. Positive investment in animal welfare.
PXSCX	Russell 2000	Combination of positive and restricted/exclusionary strategies in alcohol, gambling and animal welfare. No investment in tobacco and defense weapons.
MMSCX	Russell 2000	Restricted/exclusionary investments in animal welfare and no investments in alcohol, defense weapons, gambling and to tobacco.
TSMDX	S&P 1000	No Screens in alcohol. Combination of positive and restricted/exclusionary strategies in animal welfare, defense weapons, and gambling. No investment in tobacco.
WAMFX	Russell Midcap	Restricted/exclusionary investments in alcohol, defense weapons, gambling, animal welfare and tobacco.
WASMX	Russell 2500	Restricted/exclusionary investment in alcohol, defense weapons, gambling and tobacco. Combination of positive and restricted/exclusionary strategies in animal welfare.
Data Source: SIF - The Forum for Sustainable and Responsible Investments (https://charts.ussif.org/mfpc/?).		

Note: This table presents the benchmarks of ESG index funds and the followed ESG approach.

Table 3. ESG Profiles of Index Funds

Ticker	Morningstar ESG Risk		Carbon Risk Score	Fossil Fuel Involvement %
AMAGX	17.90	Low	3.11	0.46
AMANX	21.15	Medium	6.30	3.00
REDWX	19.46	Medium	5.54	0.00
CSIEX	17.21	Low	3.34	0.00
CSXAX	20.93	Medium	5.53	1.84
CGJAX	19.96	Low	3.87	0.59
CFJAX	22.59	Medium	8.90	3.67
DSEFX	19.78	Low	4.25	0.47
GCEQX	18.87	Low	4.43	0.12
NBSRX	19.07	Low	4.42	2.43
PRBLX	18.34	Low	4.49	2.28
PARWX	18.72	Low	4.04	0.00
PAXDX	20.38	Medium	8.71	18.21
PXWGX	18.23	Low	4.36	1.17
PAXLX	19.28	Low	4.93	0.00
MGNDX	18.93	Low	3.25	0.60
MVIAX	20.88	Medium	8.11	11.59
WSEFX	19.97	Low	5.85	3.51
CCAFX	20.34	Medium	7.64	5.69
CCVAX	24.93	Medium	N/A	0.00
PARMX	19.70	Low	6.90	2.86
PARNX	18.84	Low	3.90	0.00
PXSCX	25.49	Medium	N/A	0.00
MMSCX	24.65	Medium	N/A	2.79
TSMDX	21.15	Medium	9.65	0.83
WAMFX	20.16	Medium	7.77	5.09
WASMX	21.25	Medium	8.65	0.00
Average	**20.30**		**5.75**	**2.49**
Median	**19.96**		**5.23**	**0.83**
Min	**17.21**		**3.11**	**0.00**
Max	**25.49**		**9.65**	**18.21**
Source: www.morningstar.com.				

Note: This table presents the ESG profiles of Index Funds as of 31/07/2022 which include the Morningstar ESG Risk Score, the Carbon Risk Score and the percentage of the Fossil Fuel Involvement.

Table 4. Correlations

Ticker	Panel A: Daily Returns				Panel B: Weekly Returns			
	Index 1	**Index 2**	**Index 3**	**Index 4**	**Index 1**	**Index 2**	**Index 3**	**Index 4**
AMAGX	0.92	0.92	0.93	0.93	0.91	0.92	0.92	0.92
AMANX	0.91	0.90	0.90	0.90	0.90	0.90	0.90	0.89
REDWX	0.92	0.91	0.91	0.91	0.93	0.93	0.92	0.92
CSIEX	0.93	0.93	0.93	0.93	0.92	0.93	0.91	0.92
CSXAX	0.99	0.98	0.99	0.99	0.99	0.99	0.99	0.99
CGJAX	0.96	0.96	0.96	0.97	0.96	0.96	0.96	0.96
CFJAX	0.92	0.91	0.91	0.91	0.92	0.91	0.91	0.90
DSEFX	0.65	0.65	0.65	0.65	0.62	0.63	0.63	0.63
GCEQX	0.99	0.98	0.99	0.99	0.99	0.99	0.99	0.99
NBSRX	0.91	0.91	0.90	0.90	0.91	0.91	0.91	0.91
PRBLX	0.93	0.93	0.93	0.93	0.93	0.92	0.93	0.93
PARWX	0.88	0.87	0.87	0.87	0.88	0.87	0.87	0.86
PAXDX	0.72	0.72	0.72	0.72	0.69	0.69	0.68	0.68
PXWGX	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
PAXLX	0.88	0.87	0.87	0.87	0.89	0.89	0.88	0.89
MGNDX	0.95	0.95	0.96	0.96	0.95	0.94	0.95	0.95
MVIAX	0.92	0.90	0.91	0.90	0.92	0.91	0.91	0.90
WSEFX	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
CCAFX	0.89	0.89	0.88	0.88	0.89	0.89	0.88	0.88
CCVAX	0.86	0.85	0.84	0.84	0.86	0.86	0.85	0.85
PARMX	0.94	0.94	0.93	0.93	0.94	0.95	0.94	0.94
PARNX	0.89	0.89	0.89	0.89	0.90	0.90	0.89	0.90
PXSCX	0.85	0.84	0.84	0.83	0.88	0.88	0.86	0.86
MMSCX	0.79	0.79	0.78	0.77	0.81	0.81	0.80	0.79
TSMDX	0.91	0.91	0.90	0.90	0.92	0.92	0.91	0.90
WAMFX	0.92	0.92	0.91	0.91	0.93	0.93	0.92	0.92
WASMX	0.92	0.92	0.91	0.90	0.93	0.93	0.92	0.91
Average	**0.90**	**0.89**	**0.89**	**0.89**	**0.90**	**0.90**	**0.89**	**0.89**
Median	**0.92**	**0.91**	**0.91**	**0.90**	**0.92**	**0.91**	**0.91**	**0.90**
Min	**0.65**	**0.65**	**0.65**	**0.65**	**0.62**	**0.63**	**0.63**	**0.63**
Max	**0.99**	**0.98**	**0.99**	**0.99**	**0.99**	**0.99**	**0.99**	**0.99**

Note: This table presents the correlation estimates of each ESG Index Fund with the S&P 500 Index (Index 1), the MSCI USA ESG Select Index (Index 2), the S&P 500 ESG Index (index 3), and the S&P United States Large-Mid-Cap ESG Index (Index 4).

Table 5. Betas

Ticker	Panel A: Daily Returns								Panel B: Weekly Returns							
	Index 1	**T-test**	**Index 2**	**T-test**	**Index 3**	**T-test**	**Index 4**	**T-test**	**Index 1**	**T-test**	**Index 2**	**T-test**	**Index 3**	**T-test**	**Index 4**	**T-test**
AMAGX	0.94[a]	-5.93	0.94[a]	-5.56	0.93[a]	-6.38	0.93[a]	-6.80	0.89[a]	-4.26	0.90[a]	-4.22	0.90[a]	-4.08	0.90[a]	-4.22
AMANX	0.84[a]	-14.70	0.84[a]	-14.38	0.83[a]	-15.25	0.82[a]	-15.75	0.83[a]	-6.47	0.84[a]	-6.51	0.84[a]	-6.35	0.83[a]	-6.52
REDWX	1.10[a]	7.55	1.10[a]	6.93	1.08[a]	6.15	1.08[a]	5.72	1.22[a]	6.99	1.22[a]	7.13	1.21[a]	6.48	1.20[a]	6.28
CSIEX	0.93[a]	-7.43	0.93[a]	-6.94	0.92[a]	-8.07	0.91[a]	-8.59	0.91[a]	-3.83	0.91[a]	-3.76	0.91[a]	-3.78	0.90[a]	-3.89
CSXAX	1.01[b]	2.52	1.01	1.51	1.00	0.98	1.00	-0.11	0.99	-0.52	0.99	-0.83	1.00	-0.30	0.99	-0.62
CGJAX	1.05[a]	6.32	1.06[a]	6.05	1.05[a]	6.41	1.05[a]	6.51	1.00	0.06	1.00	0.07	1.01	0.50	1.01	0.50
CFJAX	0.94[a]	-5.33	0.93[a]	-5.57	0.93[a]	-6.39	0.92[a]	-7.10	0.97	-1.06	0.96	-1.32	0.96	-1.35	0.95[c]	-1.60
DSEFX	0.97	-0.82	0.97	-0.78	0.97	-0.99	0.97	-1.07	0.97	-0.42	0.98	-0.27	0.98	-0.30	0.98	-0.30
GCEQX	1.02[a]	4.50	1.02[a]	3.37	1.01[b]	2.91	1.01[c]	1.73	1.00	0.08	1.00	-0.18	1.00	0.42	1.00	0.16
NBSRX	0.95[a]	-4.25	0.95[a]	-3.96	0.94[a]	-5.00	0.93[a]	-5.52	0.99	-0.48	0.99	-0.51	0.99	-0.48	0.98	-0.64
PRBLX	0.94[a]	-6.29	0.93[a]	-6.23	0.93[a]	-6.91	0.92[a]	-7.45	0.92[a]	-3.55	0.91[a]	-3.71	0.92[a]	-3.42	0.92[a]	-3.58
PARWX	1.07[a]	4.61	1.07[a]	3.89	1.06[a]	3.41	1.05[b]	2.90	1.11[a]	3.01	1.10[b]	2.57	1.10[b]	2.59	1.10[b]	2.40
PAXDX	0.89[a]	-4.77	0.88[a]	-4.98	0.88[a]	-5.22	0.87[a]	-5.49	0.87[b]	-2.33	0.86[b]	-2.41	0.86[b]	-2.38	0.86[b]	-2.44
PXWGX	0.95[a]	-4.25	0.94[a]	-4.29	0.94[a]	-4.86	0.93[a]	-5.28	0.97	-0.97	0.97	-1.02	0.97	-0.94	0.97	-1.03
PAXLX	0.98	-1.09	0.98	-1.19	0.97[c]	-1.67	0.97[b]	-2.06	1.06[c]	1.63	1.06[c]	1.69	1.06[c]	1.60	1.05	1.55
MGNDX	1.06[a]	5.89	1.05[a]	5.16	1.05[a]	5.96	1.05[a]	6.02	1.01	0.50	1.01	0.38	1.02	1.09	1.02	1.02
MVIAX	0.91[a]	-8.37	0.90[a]	-8.60	0.89[a]	-9.26	0.88[a]	-9.91	0.95[b]	-2.07	0.94[b]	-2.39	0.94[b]	-2.25	0.93[b]	-2.53
WSEFX	0.96[a]	-6.92	0.95[a]	-6.62	0.95[a]	-7.88	0.94[a]	-8.70	0.96[b]	-2.86	0.95[a]	-3.06	0.96[b]	-2.71	0.95[a]	-3.01
CCAFX	0.93[a]	-4.83	0.93[a]	-4.74	0.92[a]	-5.69	0.92[a]	-6.10	1.00	0.13	1.00	0.07	1.00	-0.08	0.99	-0.22
CCVAX	0.95[b]	-2.80	0.95[b]	-2.80	0.93[a]	-3.86	0.93[a]	-4.28	1.00	-0.08	0.99	-0.17	0.98	-0.41	0.98	-0.56
PARMX	0.89[a]	-11.52	0.90[a]	-11.05	0.88[a]	-12.23	0.87[a]	-12.77	0.95[b]	-2.49	0.95[b]	-2.46	0.94[b]	-2.58	0.94[b]	-2.74
PARNX	1.03[b]	2.03	1.04[b]	2.75	1.02	1.38	1.02	1.49	1.05	1.46	1.06[c]	1.83	1.05	1.45	1.05	1.57
PXSCX	0.99	-0.84	0.99	-0.83	0.97[c]	-1.95	0.96[b]	-2.27	1.10[b]	2.75	1.10[b]	2.78	1.09[b]	2.29	1.09[b]	2.23
MMSCX	1.05[b]	2.28	1.05[b]	2.10	1.03	1.17	1.02	0.76	1.15[b]	2.83	1.14[b]	2.74	1.13[b]	2.44	1.12[b]	2.28
TSMDX	1.03[b]	2.58	1.03[b]	2.59	1.01	0.94	1.00	0.36	1.11[a]	3.57	1.11[a]	3.69	1.09[b]	2.93	1.09[b]	2.74
WAMFX	0.91[a]	-8.49	0.91[a]	-8.09	0.89[a]	-9.41	0.88[a]	-9.98	0.98	-0.88	0.98	-0.93	0.97	-1.14	0.96	-1.42
WASMX	0.94[a]	-5.42	0.94[a]	-4.95	0.92[a]	-6.54	0.91[a]	-7.14	1.01	0.27	1.01	0.43	1.00	-0.11	0.99	-0.37
Average	**0.97**		**0.97**		**0.96**		**0.95**		**1.00**		**1.00**		**1.00**		**0.99**	
Median	**0.95**		**0.95**		**0.94**		**0.93**		**0.99**		**0.99**		**0.99**		**0.98**	
Min	**0.84**		**0.84**		**0.83**		**0.82**		**0.83**		**0.84**		**0.84**		**0.83**	
Max	**1.10**		**1.10**		**1.08**		**1.08**		**1.22**		**1.22**		**1.21**		**1.20**	

a: statistically different from unity at 1% level; b: statistically different from unity at 5%; c: statistically different from unity significance at 10% level.

Note: This table presents the beta estimates of each ESG Index Fund (single-factor model) against the S&P 500 Index (Index 1), the MSCI USA ESG Select Index (Index 2), the S&P 500 ESG Index (index 3), and the S&P United States Large-Mid-Cap ESG Index (Index 4) over the period 1 August 2017 to 31 July 2022. T-tests assess the differences of betas from unity.

Table 6. Analysis of ESG Index Funds' Holdings vs the S&P 500 Index

Ticker	Severe ESG Risk (%)	High ESG Risk (%)	Total Severe & High ESG Risk (%)	Medium ESG Risk (%)	Low ESG Risk (%)	Negligible ESG Risk (%)	Total S&P 500 Index Exposure	Other non-S&P 500 Holdings (%)	Unknown	Total Portfolio (%)	Invested in Tesla[1]	Invested in Amazon[2]
AMAGX	2.06	3.36	5.42	20.96	49.67	2.62	78.67	21.33	0.00	100.00	No	No
AMANX	0.00	11.03	11.03	29.53	34.10	2.51	77.17	22.83	0.00	100.00	No	No
REDWX	0.00	1.86	1.86	19.22	32.27	2.79	56.14	15.89	27.97	100.00	No	No
CSIEX	0.00	0.00	0.00	23.24	68.75	3.18	95.17	4.83	0.00	100.00	No	No
CSXAX	0.36	6.89	7.25	36.92	43.00	0.97	88.14	11.86	0.00	100.00	Yes	Yes
CGJAX	0.05	7.58	7.63	32.15	50.46	1.21	91.45	8.55	0.00	100.00	Yes	Yes
CFJAX	1.01	6.07	7.08	45.76	28.44	0.40	81.68	18.32	0.00	100.00	No	No
DSEFX	0.19	4.79	4.98	28.76	46.72	1.83	82.29	17.71	0.00	100.00	Yes	Yes
GCEQX	0.27	2.84	3.11	38.20	51.82	2.92	96.04	3.96	0.00	100.00	Yes	No
NBSRX	0.00	2.88	2.88	22.19	34.96	0.00	60.03	13.34	26.63	100.00	No	No
PRBLX	0.00	3.70	3.70	30.50	57.50	2.80	94.50	5.50	0.00	100.00	No	No
PARWX	0.00	2.20	2.20	38.50	47.40	1.50	89.60	10.40	0.00	100.00	No	No
PAXDX	0.00	0.00	0.00	7.35	8.22	0.00	15.57	21.56	62.87	100.00	No	No
PXWGX	0.00	1.54	1.54	11.42	31.27	0.00	44.23	3.99	51.78	100.00	No	No
PAXLX	0.00	4.04	4.04	22.61	30.63	0.00	57.28	1.94	40.78	100.00	No	Yes
MGNDX	0.00	8.94	8.94	11.29	37.47	1.81	59.51	1.30	39.19	100.00	Yes	Yes
MVIAX	0.00	3.79	3.79	18.26	6.41	4.08	32.54	1.46	66.00	100.00	No	No
WSEFX	0.00	8.17	8.17	18.26	33.28	2.96	62.67	3.16	34.17	100.00	No	No
CCAFX	0.00	2.30	2.30	24.24	33.93	0.00	60.47	39.53	0.00	100.00	No	No
CCVAX	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	100.00	No	No
PARMX	0.00	0.00	0.00	29.70	40.40	0.00	70.10	29.90	0.00	100.00	No	No
PARNX	0.00	0.00	0.00	18.90	41.20	0.00	60.10	39.90	0.00	100.00	No	No
PXSCX	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.80	44.20	100.00	No	No
MMSCX	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.05	84.95	100.00	No	No
TSMDX	0.00	3.54	3.54	5.45	8.63	0.00	17.62	34.28	48.10	100.00	No	No
WAMFX	0.00	3.64	3.64	13.44	21.18	0.00	38.26	8.99	52.75	100.00	No	No
WASMX	0.00	1.80	1.80	1.99	14.45	0.00	18.24	25.22	56.54	100.00	No	No
Average	**0.15**	**3.37**	**3.51**	**20.33**	**31.56**	**1.17**	**56.57**	**19.87**	**23.55**	**100.00**		
Median	**0.00**	**2.88**	**3.11**	**20.96**	**33.93**	**0.40**	**60.10**	**15.05**	**0.00**	**100.00**		
Min	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.30**	**0.00**	**100.00**		
Max	**2.06**	**11.03**	**11.03**	**45.76**	**68.75**	**4.08**	**96.04**	**100.00**	**84.95**	**100.00**		

[1] Investing in Tesla, Inc. is used as an indication of an Index Fund's non full-adherence to ESG principles because this company was ineligible for inclusion in the S&P 500 ESG Index, during the rebalancing of the index at the end of April, 2022, due to its low S&P DJI ESG Score.

[2] Investing in Amazon.com is used as a further indication of an Index Fund's non full-adherence to ESG principles because this company has attracted serious criticism about its practices which are not considered to be in line with the best ESG practices.

Note: This table presents a breakdown of ESG Index Funds' holdings vs the components of the S&P 500 Index based on the ESG Risk Scores awarded by Morningstar. Five ESG Risk categories are assumed by Morningstar for the components of the S&P 500 Index, namely Severe Risk, High Risk, Medium Risk, Low Risk, and Negligible Risk.