# The complex materiality of ESG ratings: Evidence from actively managed ESG funds

*Abstract*

We introduce Active ESG Share as a novel metric of the extent of a fund manager's use of ESG information. Active ESG Share compares the full distribution of a portfolio's stock-level ESG ratings to that of its benchmark, capturing how actively a manager uses ESG information, rather than whether the manager tends to favor stocks with high or low ESG ratings. We find a positive relation between Active ESG Share and the future performance of actively managed mutual funds, but only among ESG funds, which we attribute to the importance of specialization. The results are strongest for ESG funds that tend to hold stocks with a high level of ESG ratings disagreement or uncertainty, consistent with such disagreement and uncertainty creating opportunity for active managers. Our results suggest that ESG information is financially material, but complex, and thus cannot be successfully capitalized on using simple directional strategies.

## 1. Introduction

ESG (Environmental, Social, and Governance) investing—alternatively, socially responsible investing or sustainable investing—is growing rapidly in popularity. In the fourth quarter of 2019, ESG fund assets stood globally at nearly $1 trillion. Just two years later, in the fourth quarter of 2021, those assets stood at nearly $3 trillion.[1] That growth has created controversy about ESG information's financial materiality, i.e., its relation with stock performance. For example, the U.S. Department of Labor (DOL), under the Trump administration, established a final rule that prevented "fiduciaries from selecting investments based on non-pecuniary considerations;" however, under the Biden administration, the DOL announced that "until the publication of further guidance, the department will not enforce either final rule or otherwise pursue enforcement actions."[2] In the states of Florida and Texas, limits have been put forth on ESG investing, with the Florida resolution stating that the state would invest "without consideration for nonpecuniary beliefs."[3,4]

The existing research on ESG funds and financial materiality has primarily focused on whether funds incorporate ESG considerations into their investment process and, if they do, whether investing in stocks with high or low ESG ratings impacts fund performance.[5] This focus in existing research on what we call 'Directional ESG' in effect evaluates the materiality of ESG

[1] Statistics from Morningstar's *Global Sustainable Fund Flows: Q2 2022 in Review*.
[2] See *U.S. Department of Labor Announces Final Rule to Protect Americans' Retirement Investments* and *US Department of Labor Releases Statement on Enforcement of its Final Rules on ESG Investments, Proxy Voting by Employee Benefit Plans*:
www.dol.gov/newsroom/releases/ebsa/ebsa20201030 and www.dol.gov/newsroom/releases/ebsa/ebsa20210310
[3] See *Florida, Texas Crack Down on ESG Investments in State Funds* (Barron's, August 25, 2022):
https://www.barrons.com/advisor/articles/florida-texas-esg-investments-state-pension-funds-51661453472
[4] See *A Resolution Directing an Update to the Investment Policy Statement and Proxy Voting Policies for the Florida Retirement System Defined Benefit Pension Plan, and Directing the Organization and Execution of an Internal Review*: https://www.flgov.com/wp-content/uploads/2022/08/ESG-Resolution-Final.pdf
[5] See, for example, Nofsinger and Varma (2014), Hartzmark and Sussman (2019), Pastor and Vorsatz (2020), and Madhavan, Sobczyk, and Ang (2021).

ratings as such. That is, the materiality of a summary statistic of the underlying complexity of a firm's ESG policies and exposures.

The main contribution of our paper is to investigate more broadly the materiality of ESG information, first by measuring the extent to which active fund managers incorporate ESG information into their portfolio decisions, and second by evaluating how that incorporation impacts subsequent fund performance and flows. We measure the influence of ESG information on portfolio construction through a novel metric we label 'Active ESG Share.' We calculate Active ESG Share by comparing the portfolio weights of a fund to those in its benchmark at the ESG ratings level. Consequently, a higher Active ESG Share indicates that the ESG ratings distribution of the fund is more different from that of its benchmark, which, in turn, indicates increased use of ESG information by the fund manager when making active portfolio decisions.

Fund managers can, importantly, be active relative to their benchmark with respect to ESG information by having both more portfolio weight in stocks with higher ESG ratings and by having more portfolio weight in stocks with lower ESG ratings. Therefore, a fund manager with a high Active ESG Share—that is, one aggressively using ESG information (because her proprietary ESG analysis significantly disagrees with the ESG ratings)—could have a high, low, *or* neutral Directional ESG. In particular, a manager could change her Active ESG Share, but not change her Directional ESG, by simultaneously increasing or decreasing the representation of both high and low ESG-rated stocks (i.e., symmetrically adjusting the distribution of ESG ratings). Put another way, Directional ESG only considers the average ESG rating of the stocks in a portfolio, whereas Active ESG Share considers the entire distribution.

If there is complex, material ESG information that cannot be captured by an ESG rating alone, then analyzing ESG information effectively should require specialization. We would,

plausibly, expect that ESG funds are more likely to have managers with particular expertise in ESG information, and thus we would also expect that the impact on performance of increased Active ESG Share will be larger among ESG funds. In addition, as shown in the previous literature, ESG rating providers differ substantially (i) in what information they consider and (ii) in how they assess that information, leading to meaningful differences in the ESG ratings they subsequently produce.[6] Serafeim and Yoon (2022a) show that such disagreement in ESG ratings is associated with decreased price efficiency, which helps us sharpen our hypothesis about the relation between Active ESG Share and fund performance. It is among the stocks where disagreement is greatest that active managers are most likely to have the opportunity to identify and utilize material information not yet incorporated into prices. Accordingly, we would expect the impact of Active ESG Share to be strongest among ESG funds that focus on stocks with high levels of ESG ratings disagreement.

Our hypotheses are also undergirded by the competitive nature of the mutual fund industry, as documented and discussed in Cremers, Ferreira, Matos, and Starks (2016) and Cremers (2017). Assuming variation in skill and given the intense competition for assets, we would expect a positive relation between activeness and skill. While a manager lacking skill could, in theory, hold a very active portfolio, the costs of activeness (e.g., increased volatility) make that choice unlikely.[7] Among non-ESG funds, we expect limited intentional ESG-related investing and relatively low levels of ESG investing skill. However, among ESG funds, we expect significant

[6] See, for example, Chatterji, Durand, Levine, and Touboul (2016), Dimson, Marsh, and Staunton (2020), Brandon, Krueger, and Schmidt (2021), Christensen, Serafeim, and Sikochi (2022), and Avramov, Cheng, Lioui, and Tarelli (2022).

[7] What we label the costs of activeness could, in particularly instances, actually be benefits. For example, Kempf, Ruenzi, and Thiele (2009) show that, when a fund manager's termination risk is low, they will increase volatility in an attempt to recover from past underperformance (at the risk of further increasing the past underperformance). But, in general, as shown by Chevalier and Ellison (1999), the shape of the relation between termination and performance incentivizes avoiding such volatility increases.

intentional ESG-related investing and meaningful variation in ESG investing skill. Accordingly, we would expect that differences in ESG information usage would predict differences in fund performance for only ESG funds (or, more precisely, that Active ESG Share would predict fund performance to greater extent for ESG funds relative to non-ESG funds).[8]

On a technical level, Active ESG Share is an adaptation of Cremers and Petajisto's (2009) Active Share. Active Share compares a fund's portfolio weights against the fund's benchmark portfolio weights and is calculated as half the sum of the absolute differences in portfolio weights across all stocks in either the fund or its benchmark. Active ESG Share is calculated in the same manner but at the ESG ratings level rather than at the stock level. If a fund's ESG ratings distribution and that of its benchmark closely overlap, then Active ESG Share will be low, and that fund will be considered relatively inactive with respect to ESG information.

Suppose, as a simplified example, there are three ESG rating categories—High (+1), Medium (0), and Low (−1)—and two funds with the same benchmark—Fund A and Fund B. If Fund A's portfolio consists of 50% securities with a High ESG rating and 50% securities with a Low ESG rating, while the benchmark is split 30%/40%/30% into High/Medium/Low, then the Active ESG Share for Fund A would be (20%+40%+20%)/2 = 40%. If all of Fund B's holdings had a Medium ESG rating, then the Active ESG Share for Fund B would be (30%+60%+30%)/2 = 60%. In such a case, Fund B would be considered one and a half times more active than Fund A with respect to the usage of ESG information. Both Fund A and Fund B would, however, have the same average ESG rating as the benchmark, with all having an average ESG rating of 0.

[8] We would not necessarily expect to see an overall difference in performance between ESG and non-ESG funds. Managers of non-ESG funds will likely be specialized in some type of non-ESG information or be strong generalists. Their continued employment would otherwise be difficult to explain.

We measure Active ESG Share over the period Q1 2004 through Q2 2021 for a large, survivorship-bias-free sample of actively managed U.S. equity mutual funds. For our stock-level ESG rating metric, we primarily use the MSCI ESG Intangible Value Assessment (IVA) Company Rating, which provides a relatively long sample and is commonly used by professionals and in academic research.[9] The MSCI ESG rating is an industry-adjusted evaluation of a stock's exposure to ESG risks that is based on MSCI's evaluation of company disclosures and specialized data sets. MSCI places stocks into one of seven categories, ranging from AAA (the highest) to CCC (the lowest), which we convert to integers (i.e., AAA is +3, AA is +2, etc., CCC is −3). The ratings tend to be concentrated in the middle categories, with relatively few +3's and −3's, and the ratings for large-cap stocks tend to be higher than those of small-cap stocks.

In some tests, we also use stock-level ESG ratings from TVL (TruValue Labs) and KLD (Kinder, Lydenberg, and Domini). These additional ratings are used to establish the robustness of our results and to measure disagreement in ESG ratings. We first calculate disagreement at the stock level by placing the ESG ratings from MSCI, TVL, and KLD on a common scale and calculating the standard deviation.[10] We calculate our fund-level measure of disagreement, 'ESG Ratings Disagreement', by using a fund's portfolio weights to calculate a value-weighted average of the stock-level measures.

We classify a fund as ESG focused if Morningstar identifies it as such or if a fund has certain key terms in its name (e.g., 'climate' or 'social'). Our sample of actively managed funds contains 243 ESG funds and 1,875 non-ESG funds. Consistent with the growth we discussed

[9] See, e.g., Liang and Renneboog (2017), Dai, Liang, and Ng (2021), and Christensen, Serafeim, and Sikochi (2022).
[10] The standard deviation is used as a measure of stock-level disagreement in many previous studies including Brandon, Krueger, and Schmidt (2021), Avramov, Cheng, Lioui, and Tarelli (2022), and Serafeim and Yoon (2022a).

earlier, the proportion of ESG funds in our sample increases over time, from 10% of funds and 15% of assets in 2004 to 18% of funds and 20% of assets in 2021.

Across our sample, the average Active ESG Share is about 15%. Active Share, conversely, has an average of 76%, such that most activeness is not in the ESG dimension. Directional ESG, which we estimate as the difference between the value-weighted averages of a portfolio's ESG ratings and its benchmark's ESG ratings, is, on average, −0.11, which indicates a lag behind the benchmark of about one-tenth of an ESG ratings category. Active ESG Share and Directional ESG have a correlation of −35%, showing that highly active ESG strategies tend to have lower ESG ratings. Consistent with disagreement across ESG rating providers, Active ESG Share measured using our default MSCI data has correlations with Active ESG Share measured using the KLD and TVL data alternatives of 61% and 39%, respectively.

Our primary hypothesis is that ESG information is material, but complex. For actively managed funds, the materiality means that managers can use ESG information in their portfolio construction to improve fund performance, while the complexity means that the performance improvement should be expected to vary depending on the manager's level of ESG expertise. The performance improvement should, furthermore, be expected to vary depending on the extent to which ESG information is not yet incorporated in stock prices, which is a function of (or proxied by) the level of disagreement in ESG ratings.

More precisely, our expectation is that funds that incorporate more ESG information into their investment process will perform better only if their managers have specialized in ESG investing. We, accordingly, predict a positive relation between Active ESG Share and future performance only among ESG funds, because those funds are more likely to have managers with specialization in ESG investing. Our empirical evidence is consistent with that prediction. On

average across all funds, Active ESG Share does not have an economically or statistically significant relation with future performance. Higher Active ESG Share does, however, predict better performance among ESG funds. Relative to non-ESG funds, a one standard deviation increase in Active ESG Share for ESG funds predicts about 0.57% higher annualized performance (*t*-stat = 2.37). These results hold regardless of our data source for ESG ratings, after controlling for fund family effects, using both net and gross returns, across several different performance evaluation metrics, and if we use portfolio tests instead of panel regressions.

The positive predictability of Active ESG Share among ESG funds increases considerably over our sample period. In the first third of our sample period (Q1 2004 to Q4 2009), we find no relation between Active ESG Share and future performance among ESG funds. In the middle third (Q1 2010 to Q4 2015), a one standard deviation increase in Active ESG Share for ESG funds predicts about 0.36% higher annualized performance (*t*-stat = 3.04). In the final third though (Q1 2016 to Q2 2021), that result becomes 1.23% higher annualized performance (*t*-stat = 2.46). The increasingly strong impact of Active ESG Share is consistent with ESG information being complex. It takes time to specialize, and at the beginning of our sample period, ESG investing was, while not unknown, still a small, developing field.

The impact of Active ESG Share on performance in the cross-section of ESG funds is, as expected, concentrated among those that buy stocks with a high level of disagreement in ESG ratings. Among funds with above median ESG Ratings Disagreement, the Active ESG Share of an ESG fund increasing by one standard deviation predicts about 0.87% higher annualized performance (*t*-stat = 2.30), while among funds with below median ESG Ratings Disagreement, there is no economically or statistically significant relation, among ESG funds, between Active ESG Share and subsequent performance. As before, we attribute these results to fund managers

having greater opportunity to find material ESG information that is not yet incorporated in stock prices when there is high disagreement in ESG ratings.

We further detail the relation between Active ESG Share and performance by deconstructing the measure into its individual environmental (E), social (S), and governance (G) components. We find that, among ESG funds, each of the three components—Active E Share, Active S Share, and Active G Share—has a positive relation with future performance, but with different magnitudes. Active E Share has the largest economic impact, with a one standard deviation increase predicting about 0.65% higher annualized performance (*t*-stat = 2.32). The analogous increase for Active S Share and Active G Share, conversely, predicts 0.37% and 0.32% higher annualized performances, respectively (*t*-stats = 1.97 and 2.01). Thus, while the environmental, social, and governance components of ESG are often aggregated, at least with respect to materiality, the environmental component appears to have the most impact.

Our results with respect to Directional ESG are also consistent with the idea that ESG information is material, but complex. If the material component of ESG information could be effectively communicated by the ESG rating alone, then we would expect a positive relation between Directional ESG and subsequent performance. We find instead that, on average across all funds, there is no significant predictive relation. Furthermore, among ESG funds, relative to non-ESG funds, a one standard deviation increase in Directional ESG predicts about 0.55% lower annualized performance (t-stat = −1.98). That result is magnified among ESG funds with a high level of ESG Ratings Disagreement. Therefore, rather than providing material information, ESG ratings themselves appear to serve, from a financial perspective, as primarily a means of coordinating the trading of ESG funds, with that coordination leading to stock overpricing and, in turn, fund underperformance when the rating is uncertain.

We conclude our analysis by considering investors' capital allocations. Among non-ESG funds, there appears to be no association between Active ESG Share and the flow-performance relation; however, ESG funds with relatively high Active ESG Share have flows that are substantially more sensitive to underperformance. The flow-performance relation for ESG funds with low Active ESG Share is convex, with the sensitivity to outperformance greatly exceeding the sensitivity to underperformance. Conversely, the relation for ESG funds with high Active ESG Share nears linearity, with the sensitivities to out and underperformance being similar. These results are consistent with our expectation of a positive relation between activeness and skill. Fund managers with expertise in ESG information should be more likely to increase their Active ESG Share, exposing their funds to increased outflow risk, because only those managers can expect the upside from that risk, improved performance and greater flows, to be realized.

In conclusion, our results from actively managed mutual funds support the hypothesis that ESG information contains material, complex information. Our main result is that specialized fund managers can incorporate such information into their investment process to the benefit of their investors, especially when investing in stocks with a high level of disagreement in ESG ratings. As a corollary, our results suggest that the material component of ESG information is too complex to be captured by the ESG ratings themselves. We instead find that, on average, ESG funds that tend to buy stocks with high ESG ratings underperform.

## 2. Contribution to the Literature

Our study contributes to the broad literature on complex information and specialization and to the more particular literature on the performance impact of ESG investing.

First, our study contributes to the literature on complex information and specialization. Even if, in practice, ESG information is often reduced to broad stock- or fund-level directional

ratings, both its underlying content and its interpretation can be complex. Indeed, different ESG ratings providers have significant disagreements with each other (e.g., Avramov, Cheng, Lioui, and Tarelli, 2022), and there is no consensus in the academic literature regarding the relation between ESG information and stock returns.[11] Gompers, Ishii, and Metrick (2003), Khan, Serafeim, and Yoon (2016), and Khan (2019) find a positive relation between future returns and directional metrics of ESG, whereas Hong and Kacperczyk (2009), Bolton and Kacperczyk (2021), and Luo (2022) find a negative relation. Amel-Zadeh and Serafeim (2018) survey investment organizations and find that the most frequent motivation for considering ESG information is its relevance with respect to performance, with these organizations also reporting that they view ESG information as difficult to utilize because of a lack of reporting standards.

Given this informational complexity, we would expect specialization to be required to process it skillfully.[12] The benefits of specialization have been previously shown for fund managers focusing on, e.g., previous work experience (Cici, Gehde-Trapp, Goricke, and Kempf, 2018) and offshore operations (Bai, Tang, Wan, and Yuksel, 2022). We add to this literature by exploring specialization in the use of ESG information, as expressed through a fund's explicitly stated ESG focus. ESG funds are well-suited for an analysis of specialization because they (i) represent a specific informational specialization, (ii) can have their performance measured accurately in the same manner as their comparison group, (iii) have a sufficiently large sample, (iv) are not so constrained as to be too dissimilar from their comparison group, and (v) allow us to

[11] Inconsistency in ESG ratings across different providers is also a well-known problem among investors. See, for example, *How Much Carbon Comes From a Liter of Coke? Companies Grapple With Climate Change Math* (Wall Street Journal, August 10, 2021): www.wsj.com/articles/climate-change-accounting-for-companies-looms-with-all-its-complexities-11628608324

[12] The need for specialization with respect to ESG information is compounded by the nature of the job of a portfolio manager. A lack of specialization cannot be easily overcome through increased efforts, as portfolio manager attention is costly (Glode, 2011), limited (Gupta-Mukherje and Pareek, 2020), and must be allocated (Kacperczyk, Nieuwerburgh, and Veldkamp, 2016). Lu, Ray, and Teo (2016) show a negative impact on hedge fund performance after a negative shock to manager attention.

evaluate other economically important questions simultaneously. Moreover, the financial component of the potential benefits of an ESG fund can be readily quantified, whereas specializations such as tax-management have unique potential financial benefits that are more difficult to quantify.

Second, our study contributes to the literature considering ESG investing's impact on performance. As discussed before, there is a significant empirical debate regarding the relative performance of high and low ESG stocks, and there are similar debates for real estate (Murfin and Spiegel, 2020) and municipal bonds (Painter, 2020). These debates have motivated the development of multiple theoretical frameworks. Pastor, Stambaugh, and Taylor (2021) argue that higher ESG ratings should generally be associated with lower future average returns "because investors enjoy holding them and because green assets hedge climate risk (pg. 550)," although their framework allows for periods where higher ESG ratings are associated with higher future average returns. Conversely, Benabou and Tirole (2010), among multiple theories, posit that higher ESG ratings should be associated with higher future average returns because ESG investors "monitor management and exert voice to correct short-termism" and because such investing can "strengthen one's market position" by, for example, "placating regulators (pg. 10)."[13] Pedersen, Fitzgibbons, and Pomorski (2021) bridge these opposing arguments by contending that the impact of ESG ratings will vary depending on whether those ratings are providing material information or just affecting investor preferences.[14] In the latter case, the cost of capital for firms with high ESG ratings is lower than it would be in the absence of ESG preferences, and thus lower average

[13] Benabou and Tirole (2010) provide several different frameworks describing the underlying motivation for and the outcome of ESG investing.

[14] In the context of Pedersen, Fitzgibbons, and Pomorski (2021), the information revealed by ESG ratings is more systematic, whereas Active ESG Share is focused on more idiosyncratic information. As we discuss later, a systematic ESG rating factor does not explain our results.

returns would be expected from funds investing primarily in highly rated stocks. Confronted with that possibility, Riedl and Smeets (2017) and Bauer, Ruof, and Smeets (2021) show that investors are willing to accept lower returns if it allows them to align their investments with their ESG preferences.

We deviate from the prior work on the impact of ESG investing on performance by shifting the focus. Rather than focus on ESG directionally, we introduce a novel metric, Active ESG Share, that considers the full distribution of ESG ratings in a portfolio. This approach allows us to capture the extent to which the fund manager incorporates ESG information into their investment process in a manner consistent with the usage of ESG information reported by institutional investors.[15] While we find a significant relation between a fund's Active ESG Share and performance, prior work (Hartzmark and Sussman, 2019, and Madhavan, Sobczyk, and Ang, 2021) tends to not find a significant relation between fund performance and fund-level directional metrics of ESG, except during market crises (Nofsinger and Varma, 2014, and Pastor and Vorsatz, 2020).

## 3. Data and Key Metrics

In this section, we first discuss the formation of our sample of mutual funds and our data on benchmarks. We then discuss our stock-level ESG data, detailing both its important features and how we merge it with our other data. Finally, we discuss our key metrics and characterize our sample of mutual funds.

[15] Krueger, Sautner, and Starks (2020) survey those investors and report that they do not believe climate risks are, in aggregate, significantly mispriced (i.e., that there is a relatively small financial benefit to a directional approach) but that they do believe that ESG information is material. This seems to match their behavior, as Serafeim and Yoon (2022b) show that the market reacts to ESG news only if it is material.

*3.1. Mutual Fund Sample*

We build our sample of actively managed U.S. equity mutual funds using the CRSP Survivor-Bias-Free database, dropping all funds that CRSP identifies as an index fund or ETF. To focus on U.S. equity funds, we first determine a fund's style using Wiesenberger, Strategic Insight, and Lipper codes.[16] We then verify that style using an analysis of fund names—searching for terms not associated with U.S. equity investing (e.g., international)—and by requiring that at least 75% of fund assets be invested in common equities. We determine whether a fund is an ESG fund by using the 'Sustainable" and "Socially Conscious" variables available from Morningstar, complemented by an analysis of fund names.[17] We mitigate the Evans (2010) incubation bias by removing a fund from the sample until it is at least two years old and has first reached at least $20 million in assets. All share classes of a given fund are collapsed into a single fund using the WFICN identifier available in MFLINKs. Fund-level characteristics are asset-weighted averages of share-level characteristics, except for fund assets, which are summed across all share classes.

Fund holdings are from Thomson Reuters and are merged with CRSP using MFLINKs. In most cases, a given fund's holdings are reported in the database quarterly, at the end of March, June, September, and December. We clean the holdings data by adjusting for stock splits; dropping any holdings snapshots with less than 10 holdings, more than 400 holdings, or more than 20% of assets invested in a single holding; and requiring that the total fund assets reported in CRSP be within range of the total fund assets suggested by the holdings (±50%).

[16] Specifically, we consider a fund's style to be broadly U.S. equity if it has a Wiesenberger objective code of G, G-I, GCI, IEQ, LTG, MCG, or SCG; a Strategic Insight objective code of AGG, GMC, GRI, GRO, ING, or SCG; or a Lipper class code of EIEI, LCCE, LCGE, LCVE, MCCE, MCGE, MCVE, MLCE, MLGE, MLVE, SCCE, SCGE, or SCVE.

[17] In particular, funds are classified as ESG if they are either Sustainable or Socially Conscious according to Morningstar of if their name contains any of the following strings: *sustain, social, esg, pax, green, responsi, clean, impact, water, environm, catholic, parnassus, aquina, women, alternative energy, equality, wind energy, fossil, low carbon, amana, ecolog, eco, epiphany, solar, climate, better world, gender, just, sri, community,* and *diversity.*

*3.2. Benchmark Sample*

Our set of benchmarks includes the S&P 400, S&P 500, S&P 600, Russell 1000, Russell 2000, Russell 3000, Russell Midcap, and the value and growth components of each of those. These twenty-one benchmarks provide comprehensive coverage of the conventional style classification and cover the set of benchmarks commonly self-declared by funds (see, e.g., Cremers, Fulkerson, and Riley, 2022). The holdings for these benchmarks are either directly supplied by S&P or Russell, downloaded from Compustat, or gathered using the CRSP-reported holdings of benchmark-tracking ETFs. The benchmark holdings, like the fund holdings, are available to us at a quarterly frequency (end of March, June, September, and December).

*3.3. Stock-level ESG Ratings*

For our main or default ESG rating at the stock level, we use the MSCI ESG Intangible Value Assessment (IVA) Company Rating, which Berg, Heeb, and Kolbel (2022) find "clearly shows the strongest relationship with the holdings of ESG funds in the US (pg. 13)." MSCI deploys seven ESG rating categories, ranging from AAA (highest) to CCC (lowest). We code AAA as a +3 and CCC as −3, with the middle ratings assigned to the integers within that range. MSCI determines the ESG rating for a given stock "through a quantitative analysis of a company's exposure to ESG-driven risks and opportunities and in-depth comparison against industry peers on how well companies are managing their exposures … [based on] company financial and sustainability disclosure, specialized government & academic data sets, media searches, etc."[18] ESG data from MSCI has been used previously in multiple academic studies (e.g., Liang and Renneboog, 2017).

[18] See pages 3 and 16 of *Executive Summary: Intangible Value Assessment (IVA) Methodology*: https://www.msci.com/documents/10199/242721/IVA_Methodology_SUMMARY.pdf/cb947ab8-509e-44fd-8e4b-afb53771fbcb

When we merge this stock-level data with fund and benchmark holdings, we use the most recently disclosed ESG rating for a given stock as of the holdings' date. For example, if a stock had February 2015, March 2015, and April 2015 ESG ratings, we would assign the March 2015 ESG rating to a fund's March 2015 holdings. If the most recent ESG rating is more than 12 months old, we consider the stock to be unrated.

While the MSCI stock-level ESG rating data begin in 1999, our sample period starts later. We first consider the holdings of large-cap funds in December 2003 and only include small-cap funds starting in December 2012. As shown in Figure 1, MSCI's coverage of the large-cap (Russell 1000) and small-cap (Russell 2000) universes of stocks is insufficient before those points in time. In our analyses, we control for the percentage of fund assets that are unrated, which is required to be no more than 25% to be included in the sample, and we rescale the portfolio weights of the holdings that do have ESG ratings to sum to unity.

[Insert Figure 1]

In our final sample, we observe fund holdings between December 2003 and March 2021, which allows us to study fund performance over the period January 2004 to June 2021. During our time period, we have 68,171 fund-quarter observations belonging to 2,118 unique funds. In the full sample, about 75% of our observations are large-cap funds, but focusing from just December 2012 onward, that value is significantly less at 59%. About 14% of our observations and about 11% of our unique funds are ESG funds. The time trend of the relative proportion of ESG to non-ESG funds is illustrated in Figure 2. As shown, the proportion of ESG funds increases substantially over our time period. In 2004, ESG funds were 10% of funds and 15% of assets, whereas by 2021, those values had grown to 18% and 20%, respectively.

[Insert Figure 2]

In addition to the MSCI stock-level ESG ratings, we employ data from two additional ESG rating providers: TVL (TruValue Labs) and KLD (Kinder, Lydenberg and Domini). TVL obtains ESG-relevant news from a wide variety of sources such as analyst reports, media, and government regulators and aggregates it onto a scale ranging from 0 (most negative) to 100 (most positive), where a score 50 represents a neutral impact. TVL then ranks all covered stocks on a five-point scale, ranging from 'Leader' to 'Laggard'. KLD scores focus on information from public databases, like those on employee strikes and Environmental Protection Agency violations, and are determined by their analysts. The KLD database marks strengths and concerns within many different categories, of which we focus on the six categories which have well-populated data over a long period: environment, community, diversity, employee, governance, and product. As the set of variables within each category is not constant, we use the ones available at a given point in time. We calculate a stock's ESG rating based on the KLD data as the difference in the sums of their strengths and their concerns across all six categories—converting those ratings to a seven-point scale by winsorizing any values above +3 to +3 and any values below −3 to −3.

### *3.4. Key Metrics*

We detail in this subsection the key metrics we use in our study. We first discuss metrics based on fund holdings, namely Active Share, Directional ESG, and Active ESG Share. Then, we discuss how we measure fund performance and flows.

#### *3.4.1. Active Share*

Following Cremers and Petajisto (2009), we calculate the general level of active management of a mutual fund as:

$$Active\ Share = \frac{1}{2}\sum_{i=1}^{N}\left|w_{f,i} - w_{b,i}\right|, \quad (1)$$

where $w_{f,i}$ is the weight on stock $i$ in the fund's portfolio and $w_{b,i}$ is the weight on stock $i$ in the benchmark's portfolio. The summation is performed over the set of stocks $N$ held by either the fund or the benchmark. Active Share is bound between zero and one, with a zero indicating that the fund and benchmark have identical holdings and a one indicating that the fund and benchmark have no overlap in holdings.

We calculate Active Share for each fund at the end of each quarter relative to all twenty-one benchmarks in our set. The benchmark that results in the lowest Active Share for a given fund—that is, the benchmark that is most similar to a given fund—is labeled the minimum-active-share benchmark. We use that benchmark as the funds' benchmark during the subsequent quarter. Cremers, Fulkerson, and Riley (2022) show that the most common alternative, using the fund's self-declared benchmark, tends to result in less accurate inferences.

*3.4.2. Directional ESG*

To compare the average ESG rating of a mutual fund and its benchmark, we calculate:

$$Directional\ ESG = \sum_{e=-3}^{3} e \times w_{f,e} - \sum_{e=-3}^{3} e \times w_{b,e}, \quad (2)$$

where $w_{f,e}$ is the weight in the fund's portfolio given to stocks with an ESG rating of $e$ and $w_{b,e}$ is the weight in the fund's minimum-active-share benchmark's portfolio given to stocks with an ESG rating of $e$. A positive (negative) Directional ESG value indicates that the fund has a higher (lower) asset-weighted average ESG rating than the benchmark.

We use this benchmark-adjusted approach because funds with different investment styles are selecting stocks from sets with different ESG rating distributions. For example, large-cap stocks tend to have higher average ESG ratings than small-cap stocks (see Figure 1). Our metric of Directional ESG thus adjusts for a fund's style and is driven by a fund manager's investment decisions.

*3.4.3. Active ESG Share*

To estimate how active a mutual fund is with respect to ESG information, we calculate each fund's Active ESG Share in a manner similar to Active Share in Eq. (1) as follows:

$$Active\ ESG\ Share = \frac{1}{2}\sum_{e=-3}^{3}\left|w_{f,e} - w_{b,e}\right|, \quad (3)$$

where $w_{f,e}$ and $w_{b,e}$ are defined as they were for Directional ESG in Eq. (2). Like Active Share, Active ESG Share is bound between zero and one. An Active ESG Share of zero indicates that the fund's distribution of weights across the different ESG ratings is identical to the benchmark's distribution, with an increase in Active ESG Share indicating an increase in the difference between those distributions. Active ESG Share thus measures how similar a fund's distribution of ESG ratings is to its benchmark's—proxying for the importance of ESG information in the fund's investment strategy.

*3.4.4. Performance Evaluation*

Our primary metric of fund performance is the benchmark-adjusted return, which we calculate as the difference between the fund's return (gross or net) and its minimum-active-share benchmark's return. Using these benchmark-adjusted returns can lead to inaccurate performance evaluation if the factor exposures of a fund and its benchmark significantly differ. Consequently, many studies instead focus on the alpha from factor models. Cremers, Fulkerson, and Riley (2022), however, note that benchmark-adjusted returns generally give results similar to factor models, as long as the benchmark adjustment is performed using the minimum-active-share benchmark.

For robustness though, we also measure performance using factor model alpha. In particular, for a given fund, we calculate:

$$\alpha_t = r_t - r_{f,t} - \sum_{j=1}^{M}\beta_j \times f_{j,t}, \quad (4)$$

where $r_t$ is the return on the fund during period *t*, $r_{f,t}$ is the risk-free return during period *t*, $f_{j,t}$ is the return on factor *j* during period *t*, $\beta_j$ is the fund's exposure to factor *j*, and $\alpha_t$ is the alpha of the fund during period *t*. We use multiple sets of $M$ factors, including the CAPM, the Fama and French (1993) and Carhart (1997) four-factor model (henceforth FFC4), and the Cremers, Petajisto, and Zitzewitz (2013) four-factor model (henceforth CPZ4).[19] We estimate a fund's exposures to the factors using daily returns over the three months prior to period *t*.

The above approaches are used in our primary analysis, which employs panel regressions. Our secondary analysis employs portfolios. In that case, we calculate the average return on the benchmarks used by the funds in the portfolio, weighting the average based on the number of portfolio funds using a given benchmark (i.e., if 25% of funds use the S&P 500, then the S&P 500 is given a 25% weight). With respect to the factor model alpha and portfolios, we perform the standard regression of the portfolio's monthly excess returns against the factor's returns.

Throughout our analyses, we annualize performance to ease interpretation. We also focus on gross rather than net performance. Using gross performance allows us to separate the impact of ESG investing practices from the costs of those practices, which is important for testing some of our hypotheses. For example, if we are evaluating fund managers' abilities to process complex ESG information, we want to focus on the strength of those abilities, which will be difficult to do using net returns if there is a positive relation between the strength of those abilities and fund fees. From an investor's perspective, possible fee differences would, of course, matter. If a fund manager generates value through her ability to process complex ESG information, but also charges a fee that fully offsets that value generation, then identifying that ability in that manager would not imply an investment opportunity. Hence, we do also carry out some tests using net returns.

[19] Data for the FFC4 and CAPM factors are from WRDS. The CPZ4 factors are formed using data from Morningstar.

*3.4.5. Fund Flow*

We estimate the net flow of a given fund using the standard implied net flow calculation:

$$Net\ Flow_t = \frac{TNA_t - TNA_{t-1} \times (1+r_t)}{TNA_{t-1}}, \quad (5)$$

where $TNA_t$ is the total net assets of the fund at the end of period *t* and $r_t$ is the return on fund during period *t*. This implied net flow has been shown to be highly correlated with the actual net flow, with de Mingo-Lopez and Matallin-Saez (2017) finding that when, on a monthly basis, one is regressed against the other, the adjusted $R^2$ is 0.737. They do find potential problems when implied net flows are estimated over two or more quarters, but our results focus on single quarter estimates.

## 4. Empirical Results

*4.1. Descriptive Statistics*

We start with a general overview of our sample of funds and our key metrics. We first report results for the full sample and then provide a comparison between ESG and non-ESG funds. Panel A of Table 1 shows summary statistics for our full sample. The average fund observation has total net assets (TNA) of $2.4 billion, is 20 years old, charges an expense ratio of 1.11%, and has a turnover of 67%. The net fund flow is −1.15% per quarter on average, which is consistent with the long-run trend of money flowing out of actively managed U.S. equity funds.[20] The gross returns of these fund observations are, on average, 12% per year. The Active Share of the average fund observation is about 76%, whereas the average for Active ESG Share is only about 15%. Hence, activeness in the ESG dimension is generally a relatively modest portion of overall activeness. Directional ESG for these fund observations is, on average, about −0.11, which implies

[20] For evidence of that assertion, see ICI Factbook 2021, Figure 3.14: https://www.ici.org/system/files/2021-05/2021_factbook.pdf

that the average fund dollar is invested in stocks with slightly lower ESG ratings compared to average benchmark dollar.

[Insert Table 1]

We report the correlations between these metrics in Panel B. The two fund-level ESG metrics (Active ESG Share and Directional ESG) calculated using MSCI data have a significant negative correlation (−35%), which implies that funds pursuing a highly active strategy with respect to ESG tend to have a lower Directional ESG. Active Share has a significant positive correlation with Active ESG Share (41%) calculated using MSCI data, which is largely by construction, as a fund cannot be active in the ESG dimension without being generally active. Consistent with ESG ratings disagreement, Active ESG Share measured using the MSCI data is imperfectly correlated with Active ESG Share measured using the KLD or TVL data (61% and 39%, respectively).

In Panel C, we expand on the differences between ESG and non-ESG funds. The unadjusted gross returns of ESG funds are economically and statistically greater, on average, than those of non-ESG funds, while on a benchmark-adjusted basis, the gross returns are indistinguishable, with the difference dropping from 1.27% per year to 0.01% per year after benchmark adjustment. Active Share and Active ESG Share are similar for both groups. ESG funds have a statistically higher Directional ESG, but the difference of 0.04 is economically small. To the extent that investors expect ESG funds to hold stocks with higher ESG ratings, we conclude that investor expectations with respect to ESG funds are, on average, not being met.

Another perhaps surprising finding in Panel C is that ESG and non-ESG funds have similar average levels of Active ESG Share. We see two non-exclusive explanations for that result. First, Active ESG Share is an imperfect proxy for ESG information usage. An active manager not

focused on ESG information is likely, by chance alone, to have a non-zero Active ESG Share. Second, managers who do not specialize in ESG may be overconfident in their ability to process ESG information. Dunning and Kruger (1999) show that people less knowledgeable about a subject tend to overestimate their ability in that subject (e.g., non-ESG fund managers regarding ESG information).

*4.2. Determinants of Active ESG Share and Directional ESG*

We next consider the determinants of funds' levels of Active ESG Share and Directional ESG. Our main question is whether the variables associated with higher levels of one metric are also associated with higher levels of the other. For example, while we expect ESG funds to have higher Directional ESG, do we also observe them having higher Active ESG Share?

To answer questions like those, we estimate a model using a quarterly pooled OLS regression with the general form:

$$Active\ ESG\ Share_{i,t} = \delta \times Determinants_{i,t-1} + \varepsilon_{i,t}, \quad (6)$$

where $Active\ ESG\ Share_{i,t}$ is the Active ESG Share of fund $i$ in year-quarter $t$ and $Determinants_{i,t-1}$ is a vector including fund $i$'s assets, age, expense ratio, turnover ratio, net flow, active share, past performance, percentage of assets invested in ESG unrated stocks, and ESG disagreement as of the end of quarter $t-1$. In some specifications, we include just style and time fixed effects, while in other specifications, we further include style-by-time fixed effects. Table 2 presents estimates for the above Active ESG Share model in columns (1) and (2) and estimates for an analogous Directional ESG model in columns (3) and (4).

Expense Ratio, Active Share, and ESG Unrated Weight are the only variables consistently associated with Active ESG Share, with all three relations being positive. The Active Share relation is the strongest, which is expected given the previously discussed inherent connection

between Active Share and Active ESG Share. The expense ratio relation is consistent with Cremers and Petajisto (2009), who find a positive relation between expense ratio and Active Share. Funds with a lower level of ESG ratings coverage in their portfolio having a higher Active ESG Share suggests that funds that are highly active with respect to ESG information are more willing to invest in unrated stocks. Like with the summary statistics, being an ESG fund is not associated with higher Active ESG Share. There are, as discussed before, multiple plausible reasons behind that result, driven by technical and behavioral factors.

[Insert Table 2]

The determinants of Directional ESG are notably different from those of Active ESG Share. Being an ESG fund is associated with higher Directional ESG; we find no relation between expense ratio and Directional ESG; and higher Active Share and lower ratings coverage are linked with lower Directional ESG.[21] Put another way, the notable relations for Active ESG Share do not obtain for Directional ESG and show, in two cases, the opposite relation. Moreover, many variables not meaningfully associated with Active ESG Share, such as size, are associated with Directional ESG.

In summation, these results demonstrate some important differences between the funds with high Directional ESG and the funds with high Active ESG Share. Of most importance, unlike funds with high Directional ESG, those with high Active ESG Share tend to have slightly higher fees, tend to be more generally active, and are not more likely to be ESG funds.

[21] The positive relation between being an ESG fund and having higher Directional ESG is economically small, with an impact of about 6/100ths of a ranking increment.

*4.3. Fund Performance*

In this subsection, we provide our results on the relation between our ESG metrics and subsequent fund performance. We first present results using a regression approach, then evaluate whether the key relations hold using a portfolio approach.

*4.3.1. Primary Analysis*

We begin by estimating our base model of the relation between our ESG metrics and fund performance. Our regressions are run using a quarterly pooled OLS model with the basic form:

$$Perf_{i,t} = \beta_0 \times ESG\ Fund_{i,t} + \beta_1 \times Active\ ESG_{i,t-1} + \beta_2 \times ESG\ Fund_{i,t-1} \times Active\ ESG_{i,t-1} + \varepsilon_{i,t}, \quad (7)$$

where $Perf_{i,t}$ is the gross benchmark-adjusted return of fund *i* in year-quarter *t*; $ESG\ Fund_{i,t}$ is a dummy variable indicating whether fund *i* is an ESG fund in year-quarter *t*; and $Active\ ESG_{i,t-1}$ is the Active ESG Share of fund *i* as of the end of year-quarter *t* – 1. We also include a set of lagged control variables—assets under management, age, expense ratio, turnover, net flow, and the percentage of assets invested in ESG unrated stocks—and style-by-time fixed effects.

Estimates of this model are presented in Table 3. The first three columns consider the relation between Active ESG Share and performance. As shown in the first column, Active ESG Share and being an ESG Fund do not, in isolation, have a meaningful relation with future performance. However, column (2) shows that accounting for the interaction between being an ESG fund and Active ESG Share is critical. Compared to non-ESG funds, the impact of a one standard deviation increase in Active ESG Share for ESG funds is about 0.57% per year larger (=0.07 x 8.064) (*t*-stat = 2.33).[22] Controlling for Active Share, as we do in the third column, has

[22] We find, as shown in the internet appendix in Tables IA.1 and IA.2, a similar estimate if we switch to using TVL or KLD data to obtain stock-level ESG ratings.

little effect on that result.[23] The results for Active ESG Share conditional on being an ESG fund are consistent with our primary hypothesis. If ESG information is material, but complex, then we would expect specialization in ESG information to be necessary to derive benefits from its use. Our results show that ESG funds, whose managers are more likely have such a specialization, do benefit from incorporating more ESG information in their portfolio construction—i.e., from a higher Active ESG Share—while non-ESG funds do not.

[Insert Table 3]

The last three columns in Table 3 consider the relation between Directional ESG and future performance. The results are like those for Active ESG Share but in the opposite direction. Directional ESG does not, in general, have a meaningful relation with fund performance, but the impact of Directional ESG varies conditional on being an ESG fund. The impact of a one standard deviation increase in Directional ESG for ESG funds, compared to the impact for non-ESG funds, is smaller by about 0.55% per year (=0.32 x −1.726) (*t*-stat = −1.90).[24] That result, like before, changes only slightly after controlling for Active Share. The negative effect on performance from being an ESG fund with high Directional ESG suggests that there may be ESG funds that offer investors the non-pecuniary benefits of a portfolio of stocks with high ESG ratings at a cost to fund performance. Because we are using gross returns, that performance cost cannot be attributed to such funds charging greater fees. Rather, some managers of ESG funds with high Directional ESG may have either lower stock selection ability or an equivalent ability that is underutilized due to focusing their attention on non-pecuniary considerations appealing to investors.

[23] In the internet appendix in Table IA.3, we find no effect of active share on the performance of ESG funds.
[24] As shown in the internet appendix in Table IA.1, the results for Directional ESG disappear if we switch to using the TVL data.

*4.3.2. Time-Series Variation*

In this subsection, we analyze the time-series variation of our previous results. Our expectation is that the strength of the more positive relation between Active ESG Share and performance for ESG funds will be greater in the more recent time period. Early in our time period, ESG investing was novel, such that relatively few managers had been given the time to specialize in it. While competition in the space was lower, the dearth of ESG training and ESG tools would have made the ESG investing process more difficult to navigate. Accordingly, given the increased experience of ESG managers and the improved informational environment today, we expect our base result to be more prevalent in recent times.

Table 4 divides our time period into three approximately equal periods and shows notable trends for both Active ESG Share and Directional ESG. With respect to Active ESG Share, the relation to performance, conditional on being an ESG fund, changes considerably over time. In the earliest time period (2004 to 2009), ESG funds have no difference in their Active-ESG-Share-performance relation relative to non-ESG funds. That result flips in the later two time periods. From 2010 to 2015, a one standard deviation increase in Active ESG Share for ESG funds produces an impact 0.36% per year greater ($t$-stat = 3.04), and from 2016 to 2021, that increase for those funds produces an impact 1.23% per year greater ($t$-stat = 2.46). This considerable change over time is consistent with our complex information hypothesis: ESG investing was still a relatively new phenomenon early in our time period and it takes significant time to learn how to correctly gather and process the complex components of ESG information.

[Insert Table 4]

With respect to Directional ESG, there is no statistically significant evidence for any time trend. Still, these results suggest that the result in Table 3 that higher Directional ESG is associated

with lower subsequent performance for ESG funds is driven by the more recent periods, during which ESG investing has seized investor attention. There is an economically meaningful, but statistically insignificant, difference in performance in the last third (2016 to 2021), with a one standard deviation increase in Directional ESG for ESG funds, relative to non-ESG funds, produces an impact that is decreased by 0.91% per year ($t$-stat = −1.37).

As a whole, these results demonstrate that the time period considered makes a significant difference in the relations. Those differences speak to our specific hypotheses, but more broadly, they also indicate that, when evaluating the ESG literature, the time period used in a given study must be given sizeable contemplation. Conflicting results could simply be the outcome of actual changes over time in the underlying relations.

*4.3.3. Level of disagreement in ESG ratings*

It is well documented that ESG ratings vary across providers. For example, Avramov, Cheng, Lioui, and Tarelli (2022) find across six ESG ratings providers that "the average rating correlation is 48%. (pg. 643)." While much of this disagreement arises from differences in ratings methodology, it further indicates that the information underlying ESG ratings is complex. We expect that greater disagreement will result, on average, from greater complexity, so we can use the cross-sectional dispersion in the level of disagreement in ESG ratings to derive a stock-level proxy for the relative complexity of ESG information. The greater complexity for stocks with a high level of disagreement in ESG ratings should enable a fund manager specializing in ESG information to add greater value, relative to the value they can add analyzing stocks with little ESG rating disagreement. Indeed, Serafeim and Yoon (2022a) show that "rating disagreement hinders the incorporation of value-relevant ESG news into prices," which provides a mechanism through fund manager ESG-specific skill can operate in this context. Accordingly, we posit that the

strength of the relation between Active ESG Share and future performance among ESG funds should be stronger when ESG ratings disagreement is greater. We test that hypothesis here by considering how funds' ESG Ratings Disagreement impacts our previous results.

We generate our fund-level ESG Ratings Disagreement measure by first estimating such disagreement at the stock level. We follow the past literature (e.g., Avramov, Cheng, Lioui, and Tarelli, 2022) and use our three ESG ratings providers (MSCI, TVL, and KLD) to calculate the standard deviation of ESG ratings for each stock. This calculation requires the ratings from each provider to be on a common scale, so we put the ratings of each provider onto a five-point scale. Using MSCI as an example: the ESG ratings by MSCI are originally built on a seven-point scale (−3, −2, −1, 0, 1, 2 3), and we put them onto a five-point scale by collapsing the ratings of 2 and 3 (and of −2 and −3) together. This method is low cost because, as shown in Figure 1, the most extreme ratings are rare. We then generate our fund-level ESG Ratings Disagreement measure by value-weighting these stock-level measures based on the weights in a given fund's portfolio.

To test the impact of disagreement, we first divide our sample into two halves: fund portfolios with above and below median ESG Ratings Disagreement. Then, we estimate our base model separately within each half. In this analysis, we calculate Active ESG Share and Directional ESG share using a combination of MSCI, TVL, and KLD data.[25]

We show results from the divided samples in Table 5. Our primary finding is that the relation between Active ESG Share and performance conditional on being an ESG fund only obtains in the above-median ESG Ratings Disagreement sample. Within that sample, a one standard deviation increase in Active ESG Share for ESG funds, relative to non-ESG funds,

[25] As shown in the internet appendix in Table IA.4, using that combination of data produces results in our base model similar to those from using MSCI data alone. Consequently, the change in the calculations of Active ESG Share and Directional ESG should not alter the fundamental relations we have previously documented.

predicts higher future fund performance of about 0.87% per year (*t*-stat = 2.30). Within the below-median sample, neither ESG funds nor non-ESG funds show any significant relation between Active ESG Share and performance. Thus, consistent with our hypothesis, among fund managers specializing in ESG information, greater complexity seems to create more opportunity for fund managers to employ their investment skill and add greater value.

[Insert Table 5]

The results for Directional ESG, likewise, only obtain within the above-median ESG ratings disagreement sample. Within that sample, a one standard deviation increase in Directional ESG Share for ESG funds, relative to non-ESG funds, produces a negative impact on performance of about 1.15% per year (*t*-stat = 2.02). A potential explanation for this underperformance is that ESG funds that focus on buying stocks with high ESG scores generally trade on a signal about how the market will price a stock. However, when there is greater uncertainty, the high ESG scores are more debatable, and the funds instead trade, in a coordinated fashion, on noise.

*4.3.4. Disaggregating E, S, and G*

ESG ratings are an aggregation of environmental (E), social (S), and governance (G) components. They thus cover a wide range of issues—from how firms approach their carbon emissions to whether they stagger their board. While all those issues could be important to investors in some way, it is unclear, a priori, if the E, S, and G components have equal relevance for performance. Disaggregating E, S and G to test each's relation to performance requires that we change our source of stock-level ESG data from MSCI, which does not provide the disaggregated components necessary, to KLD, which does. As shown in the internet appendix (Table IA.2), changing our source of stock-level ESG data from MSCI to KLD produces similar base results as in Table 3, such that the change does not affect our previous discussion and interpretations.

Using the KLD data, we deconstruct Active ESG Share and Directional ESG into their separate E, S, and G components. For Active ESG Share, that means that we construct three separate metrics: Active E Share, Active S Share, and Active G Share. An analogous deconstruction is performed for Directional ESG. We then insert these separate metrics individually into our base model in the place of Active ESG Share and Directional ESG. We show the results from this analysis in Table 6.

As before, among non-ESG funds, there is little relation between our ESG measures and performance, so we focus here on the relation for ESG funds. Starting with the activeness measures, the environmental component appears to be the most important economically. A one standard deviation increase in Active E Share for ESG funds predicts about 0.65% (0.085 x 7.666) higher annualized future performance (*t*-stat = 2.32). The same change for ESG funds using Active S Share and Active G Share, respectively, predicts 0.37% (0.086 x 4.299) and 0.32% (0.067 x 4.748) higher annualized future performance (*t*-stats = 1.97 and 2.01). Accordingly, managers who specialize in ESG accrue more performance benefit from activeness in the environmental component than in the social or governance components. Whether that is because the environmental component is where managers of ESG funds are more skilled, or because the environmental component is where the market opportunity is greatest (because, perhaps, the information contained in the environmental component is the most material) is unclear, but at least over the prior twenty years, the net impact of skill and opportunity has not been equal across the three ESG components.

[Insert Table 6]

Moving to the directional measures, the environmental component is again the most important economically. A one standard deviation increase in Directional E for ESG funds is

associated with 0.55% (0.320 x -1.704) lower annualized future performance (*t*-stat = −2.18). The social component here though is of equal economic importance. A one standard deviation increase in Directional S for ESG funds is associated with 0.61% (0.637 x -0.959) lower annualized performance (*t*-stat = −2.14). There is not an economically or statistically significant relation between Directional G and performance among ESG funds. Combining these results with the disaggregated activeness results, it is clear that, regarding performance, the environmental component of ESG is the most economically relevant.

Thus, while the environmental, social, and governance components of ESG are often aggregated, at least with respect to relevance for future performance, the environmental component is the most important. The ESG funds that are highly active with respect to environmental issues accrue the largest performance benefits, and the ESG funds that most favor stocks that score highly with respect to environmental issues accrue the largest performance costs.

*4.3.5. Alternative Models and Performance Metrics*

To test the robustness of the results from our base model, we evaluate in this subsection whether those results vary depending on the inclusion of fund family effects and the use of performance metrics derived from net returns and factor models. Results for all of those tests are reported in Tables IA.5, IA.6, and IA.7 in the internet appendix.

Considering the effect of fund family is important because investments in ESG resources are not necessarily made at the individual fund level. For example, the acquisition of data related to ESG is likely to be done at the family, rather than fund, level. Hence, our previous results could have been driven not by anything related directly to the fund manager (e.g., their skill or specialization), but rather by the information environment provided by the manager's employer. We test that possibility by adding family fixed effects to our base model.

As shown in Table IA.5, we find that our results are robust to adding family fixed effects, which we find has little impact on our results with respect to both Active ESG Share and Directional ESG. For example, using family fixed-effects, a one standard deviation increase in Active ESG Share for ESG funds, relative to non-ESG funds, has a positive impact of 0.57% per year (*t*-stat = 2.40).

Considering the effect of switching to net returns is important to understanding the implications for investors, who only experience net returns. As shown in Table IA.6, results from using net returns are consistent with those from gross returns. Most importantly, a one standard deviation increase in Active ESG Share for ESG funds, relative to non-ESG funds, has a positive impact, on a net basis, of 0.56% per year (*t*-stat = 2.36), which is nearly identical to the earlier gross basis result.

Finally, in Table IA.7, we consider using factor models—specifically the CAPM, FFC4, and CPZ4—to estimate performance. This evaluation allows us to test whether our previous conclusions were driven not by the use of benchmark-adjusted returns. The factor model results for Active ESG Share are generally consistent with the benchmark-adjusted return results—Active ESG Share has little impact on performance, except for ESG funds. All three-factor models indicate that the difference in impact between non-ESG and ESG funds is statistically significant (*t*-stats ranging from 2.36 to 3.74), and the point estimates of the difference, given a one standard deviation increase in Active ESG Share, range from 0.65% to 0.78% per year.

Using the factor models, the results for Directional ESG are also consistent with our baseline results. The only notable difference is marginal evidence that among non-ESG funds there is a positive relation between Directional ESG and performance. That difference can, however, be readily explained. Madhavan, Sobczyk, and Ang (2021) find that "funds with high environmental

scores tend to have high quality and momentum factor loadings (pg. 69)." Two of our three-factor models, FFC4 and CPZ4, control for momentum, but none of our factor models control for quality. As we demonstrate in our later portfolio analysis, if we add the Asness, Frazzini, and Pedersen (2019) quality-minus-junk factor to our factor models, the positive predictability of Directional ESG among non-ESG funds disappears. Such additional control was not necessary for our baseline results, which used returns adjusted using the minimum-active-share benchmark, because, as demonstrated in Cremers, Fulkerson, and Riley (2022), that method of benchmark adjustment tends to account well for less traditional factor exposures (including, specifically, quality-minus-junk).

*4.4. Portfolio Analyses*

We consider the regression analyses discussed above to be the best tests of our hypotheses, as those tests allow us to evaluate our main hypotheses while simultaneously controlling for several other factors that influence performance. Nonetheless, for the sake of robustness, we reevaluate our key results here using a portfolio approach. To implement that revaluation for Active ESG Share, we first perform an independent sort on that metric (using quintiles) and fund type (ESG versus non-ESG). Then, using the ten resulting groups, we form equal-weight monthly-rebalanced portfolios.[26] An analogous procedure is followed for Directional ESG. We set the time period for performance evaluation to January 2010 through June 2021, excluding earlier years used in the regression analysis to ensure a reasonable number of funds in each portfolio. Based on our earlier sub-period regression analyses, we should expect the key relations to be present in this reduced period.

[26] Funds are excluded from the sorts and resulting portfolios during months in which more than 25% of their portfolio weights do not have an ESG rating.

We show in Table 7 the gross benchmark-adjusted returns and gross factor models alphas (CAPM, FFC4, and CPZ4) for the portfolios. For brevity, we only report results for the low and high quintiles. Panel A considers Active ESG Share, and Panel B considers Directional ESG. In both cases, our key relations obtain. The relation between Active ESG Share and performance is more positive for ESG funds, with the difference between low quintile and high quintile portfolio performance being 0.95% to 1.95% per year greater among ESG funds (*t*-statistics ranging from 2.18 to 3.72). Likewise, the relation between Directional ESG and performance is more negative for ESG funds, with the difference between low quintile and high quintile portfolio performance being 1.09% to 1.53% per year lower among ESG funds (*t*-statistics ranging from −2.33 to −3.06).[27,28]

[Insert Table 7]

Our results from using a portfolio approach are, thus, consistent with our results from using a regression approach—which indicates that the relations we are documenting are not artifacts of a particular testing method. Most importantly, as we hypothesized based on ESG information's complexity, there is, among ESG funds, a more positive predictive relation between Active ESG Share and fund performance.

*4.5. Fund Flows*

While Active ESG Share has a significant relation with fund performance, it is unclear how Active ESG Share affects investors' capital allocations. We generate evidence on those capital

[27] If we form an ESG ratings factor, by comparing the returns on value-weighted portfolios of stocks with the highest and lowest ESG ratings, and add it to our factor models, the results show little change.

[28] As expected, based on the results of Madhavan, Sobczyk, and Ang (2021), adding the Asness, Frazzini, and Pedersen (2019) quality minus-junk factor to the FFC4 and CPZ4 factor models eliminates the evidence of a positive relation between Directional ESG and performance among non-ESG funds. Such modification is less necessary using returns adjusted with the minimum active share benchmark, because, as demonstrated in Cremers, Fulkerson, and Riley (2022), that method of benchmark adjustment tends to account well for less traditional factor exposures (including, specifically, quality-minus-junk).

allocation decisions here by considering the relation between Active ESG Share and net fund flows. Our model of that relation is estimated using two piecewise linear regressions with the basic forms:

$$Flow_{i,t} = \beta_0 \times Rank_{i,t-1} \times Low\ Active\ ESG_{i,t-1} + \beta_1 \times Rank_{i,t-1} \times High\ Active\ ESG_{i,t-1} + \varepsilon_{i,t}, \quad (8)$$

$$Flow_{i,t} = \beta_0 \times Rank_{i,t-1} \times Low\ Directional\ ESG_{i,t-1} + \beta_1 \times Rank_{i,t-1} \times High\ Directional\ ESG_{i,t-1} + \varepsilon_{i,tt}, \quad (9)$$

where $Flow_{i,t}$ is the net flow of fund *i* in year-quarter *t*. $Rank_{i,t-1}$ is a vector of piecewise fund performance variables for fund *i* measured up through the end of year-quarter *t* – 1. Those performance variables allow for non-linearity and are calculated following Sirri and Tufano (1998). $Low\ Active\ ESG_{i,t-1}$ ($Low\ Directional\ ESG_{i,t-1}$) is an indicator variable for fund *i* having a below median value of Active ESG Share (Directional ESG) as of the end of year-quarter *t* – 1. The high equivalents are indicators for above median values. We also incorporate, in some specifications, a set of lagged control variables—including assets, age, expense ratio, past performance, and the percentage of the fund's TNA invested in ESG unrated stocks. All specifications include style-by-time fixed effects.

In Table 8, we estimate the models separately for ESG Funds and non-ESG funds. Among non-ESG funds, investors allocate capital in a similar manner regardless of a fund's Active ESG Share or Directional ESG. However, among ESG funds, there is a substantial difference in how investors allocate capital with respect to underperforming funds that is driven by funds' Active ESG Share. Investors in ESG funds are insensitive to the underperformance of funds with low Active ESG Share, but highly sensitive to the underperformance of funds with high Active ESG Share. Consistent with past research (e.g., Sirri and Tufano, 1998), the flow-performance relations

shown in the table are generally convex—i.e., showing more sensitive to outperformance than underperformance—but among ESG funds with high Active ESG Share, the relation is nearing linearity, with sensitive to underperformance and outperformance being similar. That difference is consistent with Cremers' (2017) contention of a positive relation between activeness and skill. High Active ESG Share is a risk only rational to take for a manager with sufficient skill in ESG information processing.

[Insert Table 8]

## 5. Conclusion

ESG investing has grown from the fringes to the mainstream. According to Google Trends, searches for "ESG" have multiplied in just the last few years.[29] The typical approach to evaluating a portfolio from an ESG perspective is directional: what is the average ESG rating of the stocks in the portfolio? Our primary contribution is to introduce Active ESG Share, which allows to study the materiality of ESG information at a deeper level. If ESG information contains signals about future stock returns beyond relatively simple patterns (e.g., high ESG stocks outperforming low ESG stocks), then it is worthwhile to consider how actively ESG information is used in portfolio construction. Active ESG Share captures the level of that activity by comparing the full distribution of the stock-level ESG ratings in a fund's portfolio to the distribution in the fund's benchmark.

Our main hypothesis is that the impact of Active ESG Share will vary depending on the portfolio manager's ESG expertise. Specifically, a manager incorporating more ESG information will lead to better performance only if that manager has meaningful ESG expertise. This conditionality occurs because ESG information is complex, and thus specialization is required to convert it into profitable investment ideas. We proxy for specialization in ESG by separating ESG

[29] Trend data is available at https://trends.google.com/trends/explore?date=all&geo=US&q=ESG

mutual funds from their non-ESG counterparts, under the assumption that the managers of ESG funds have greater ESG specialization. Accordingly, only among ESG funds do we expect to observe a significant relation between Active ESG Share and performance.

Our results are consistent with that expectation. We find little relation between Active ESG Share and performance among non-ESG funds, but the impact of Active ESG Share for ESG funds is substantial. The results are robust to using several different performance metrics and across many additional empirical tests. In summation, ESG information is complex, such that ESG ratings alone cannot capture its material components. Only fund managers specialized in processing such complex information can incorporate it successfully into their investment process.

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**Figure 1: Distribution of ESG ratings in the Russell 1000 and the Russell 2000**
These figures show the percentage of weight in the Russell 1000 (1.A) and Russell 2000 (1.B) given to stocks with various ESG ratings from MSCI. The weight distributions are recorded quarterly for the Russell 1000 over the period December 2000 through March 2021 and quarterly for the Russell 2000 over the period December 2009 through March 2021.

*Figure 1.A: Distribution of the Russell 1000*

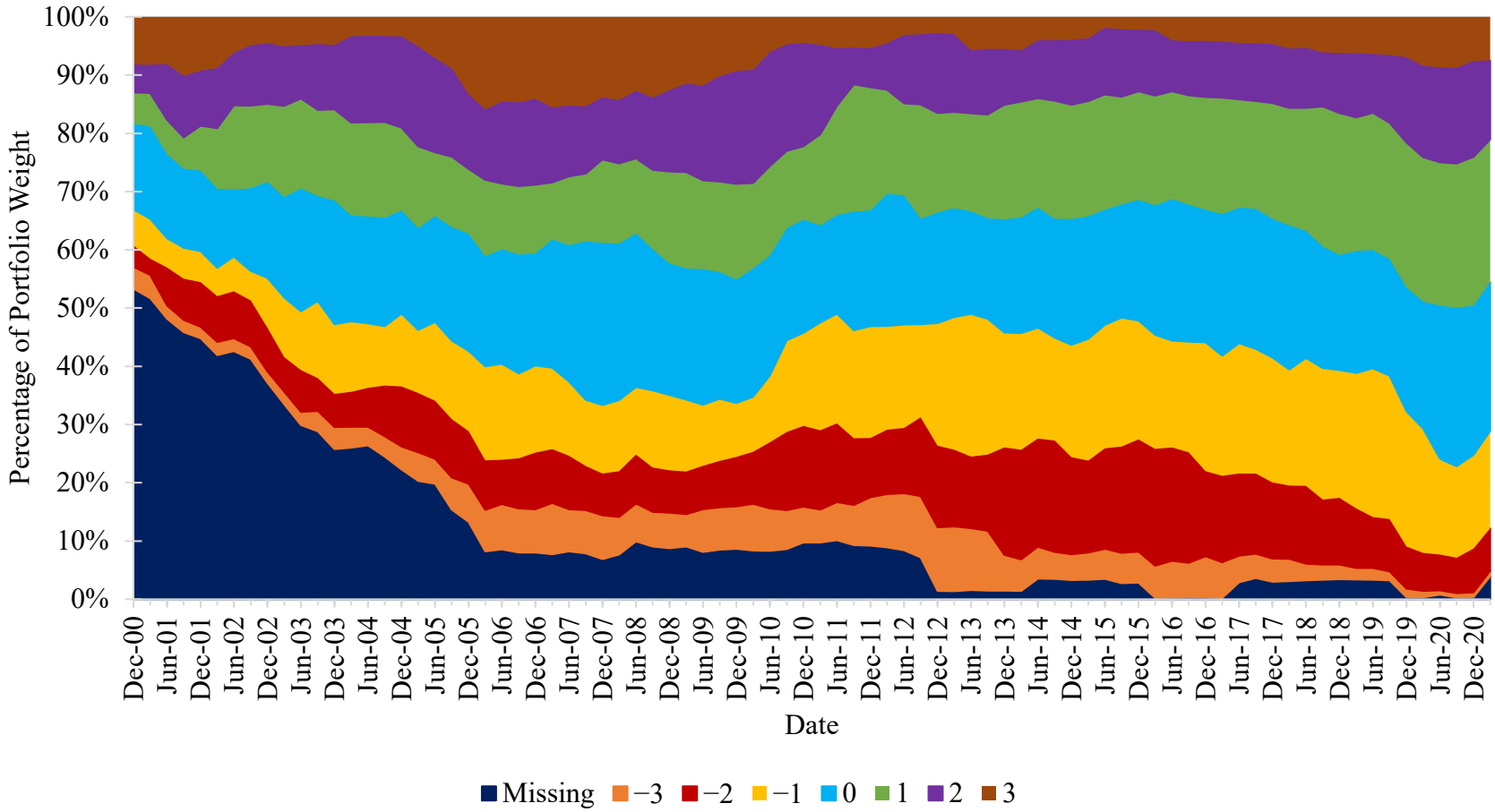

*Figure 1.B: Distribution of the Russell 2000*

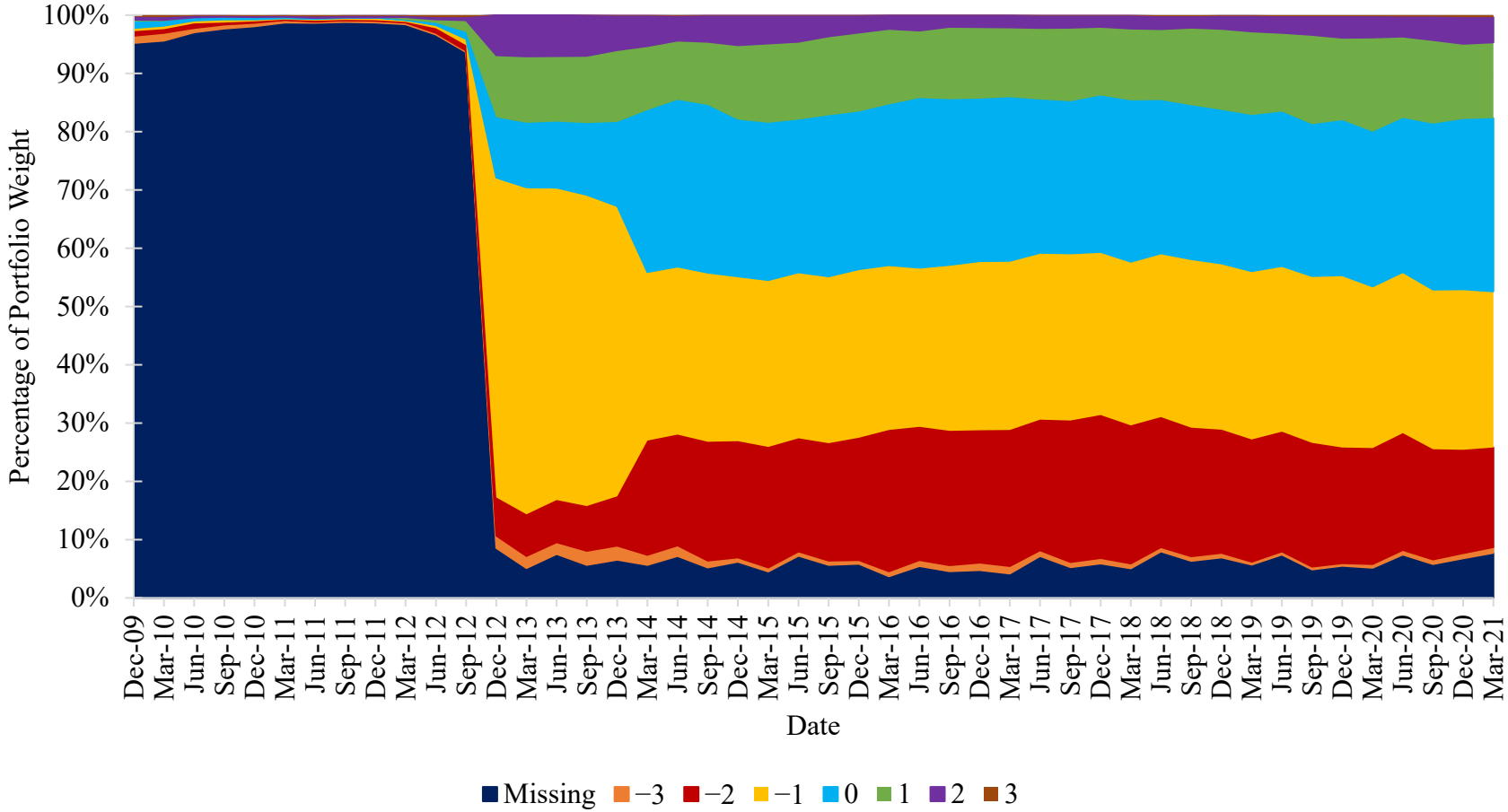

**Figure 2: Number and total net assets of ESG funds**
This figure shows the number of and total net assets (TNA) of actively managed U.S. equity ESG funds. The values are reported as a proportion of all actively managed U.S. equity funds and are recorded annually over the period 2004 through 2021.

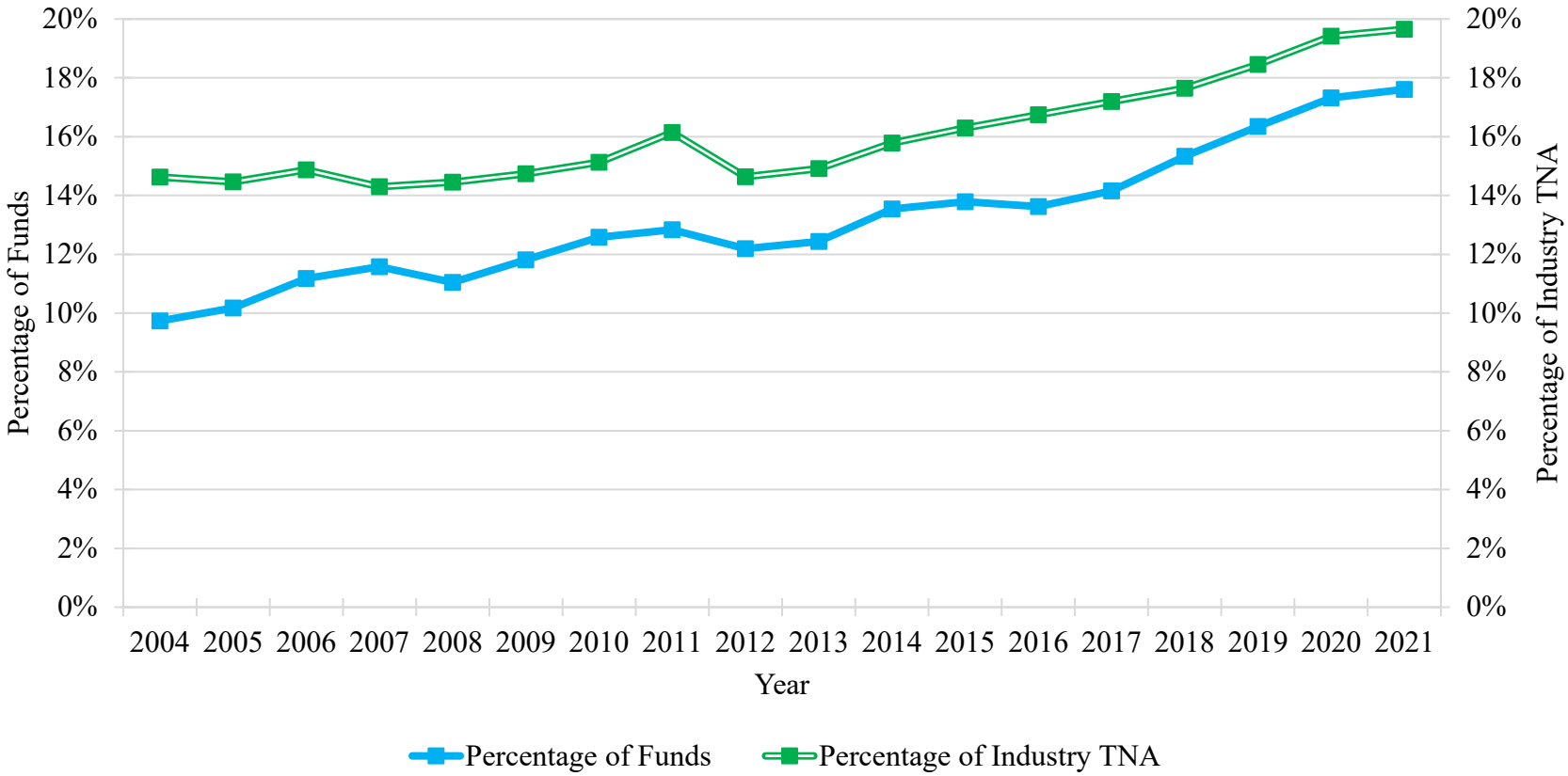

**Table 1: Summary Statistics**

This table reports summary statistics for our sample of actively managed U.S. equity funds over the period January 2004 through June 2021. Panel A presents fund-level summary statistics. Panel B shows the correlations between fund characteristics. Panel C compares the mean characteristics of ESG and non-ESG funds. * denotes significance at the 10% level, ** denotes significance at the 5% level, and *** denotes significance at the 1% level.

*Panel A: Full sample summary statistics*

| Variable | Mean | SD | P25 | P50 | P75 |
|---|---|---|---|---|---|
| TNA (Millions) | 2398.83 | 8693.91 | 110.40 | 437.95 | 1590.30 |
| Fund Age (Years) | 20.38 | 14.96 | 10.75 | 16.83 | 24.50 |
| Expense Ratio (%) | 1.11 | 0.38 | 0.89 | 1.07 | 1.28 |
| Turnover | 0.67 | 0.62 | 0.29 | 0.52 | 0.86 |
| Fund Flows (%) | -1.15 | 9.85 | -4.73 | -2.09 | 0.82 |
| Annual Return (%) | 11.92 | 36.35 | -0.66 | 14.98 | 30.59 |
| Active Share | 0.76 | 0.14 | 0.66 | 0.77 | 0.87 |
| Bmk-Adj Return (%) | 0.02 | 11.49 | -5.57 | -0.01 | 5.45 |
| Directional ESG - MSCI | -0.11 | 0.32 | -0.29 | -0.09 | 0.08 |
| Active ESG Share - MSCI | 0.15 | 0.07 | 0.10 | 0.14 | 0.19 |
| Directional ESG - KLD | -0.24 | 0.83 | -0.63 | -0.13 | 0.23 |
| Active ESG Share - KLD | 0.22 | 0.09 | 0.15 | 0.21 | 0.28 |
| Directional ESG - TVL | 0.03 | 0.14 | -0.06 | 0.02 | 0.11 |
| Active ESG Share - TVL | 0.11 | 0.06 | 0.06 | 0.09 | 0.13 |

*Panel B: Correlation between characteristics*

| | Annual Return | Active Share | Bmk-Adj Return | Direct ESG -MSCI | Act ESG Share-MSCI | Direct ESG - KLD | Act ESG Share-KLD | Direct ESG -TVL | Act ESG Share-TVL |
|---|---|---|---|---|---|---|---|---|---|
| Annual Return | 1.00 | | | | | | | | |
| Active Share | 0.01 | 1.00 | | | | | | | |
| Bmk-Adj Return | 0.35 | 0.00 | 1.00 | | | | | | |
| Direct ESG-MSCI | 0.03 | -0.13 | -0.01 | 1.00 | | | | | |
| Act ESG Share- MSCI | -0.01 | 0.41 | 0.00 | -0.35 | 1.00 | | | | |
| Direct ESG-KLD | -0.00 | -0.16 | -0.00 | 0.55 | -0.27 | 1.00 | | | |
| Act ESG Share-KLD | -0.02 | 0.37 | -0.01 | -0.30 | 0.61 | -0.35 | 1.00 | | |
| Direct ESG-TVL | -0.00 | 0.09 | -0.01 | 0.12 | 0.03 | 0.01 | 0.04 | 1.00 | |
| Act ESG Share-TVL | 0.00 | 0.43 | -0.01 | -0.10 | 0.39 | -0.16 | 0.41 | 0.11 | 1.00 |

*Panel C: Comparison between characteristics of ESG and non-ESG funds*

| Variable | Non-ESG Fund | ESG Fund | Difference |
|---|---|---|---|
| Annual Return (%) | 11.75 | 13.02 | -1.27** |
| Active Share | 0.76 | 0.76 | -0.00** |
| Bmk-Adj Return (%) | 0.02 | 0.03 | -0.01 |
| Directional ESG - MSCI | -0.12 | -0.08 | -0.04*** |
| Active ESG Share - MSCI | 0.15 | 0.15 | -0.00 |
| Directional ESG - KLD | -0.25 | -0.16 | -0.09*** |
| Active ESG Share - KLD | 0.22 | 0.22 | -0.00* |
| Directional ESG - TVL | 0.02 | 0.04 | -0.02*** |
| Active ESG Share - TVL | 0.11 | 0.11 | -0.00 |

**Table 2: Determinants of ESG investing**

This table reports estimates from regressing a fund's portfolio-level ESG characteristics on lags of its other characteristics. In the first two columns, the portfolio-level ESG characteristic is Active ESG Share. In the latter two columns, it is Directional ESG. Stock-level ESG data is from MSCI. The time period of analysis is January 2004 through March 2021. We adjust for serial correlation by clustering the standard errors associated with the coefficients at the year-quarter level. *t*-statistics associated with those standard errors are reported below the corresponding coefficients in parentheses. * denotes statistical significance at the 10% level, ** denotes at the 5% level, and *** denotes at the 1% level.

| | Active ESG Share | | Directional ESG | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| ESG Fund | -0.003 | -0.003* | 0.056*** | 0.057*** |
| | (-1.49) | (-1.65) | (3.51) | (3.64) |
| TNA (log) | 0.001 | 0.000 | -0.017*** | -0.016*** |
| | (1.16) | (0.69) | (-5.05) | (-5.00) |
| Age (log) | -0.000 | -0.000 | 0.012 | 0.012 |
| | (-0.12) | (-0.01) | (1.49) | (1.56) |
| Expense Ratio (%) | 0.006*** | 0.004** | -0.016 | -0.009 |
| | (2.61) | (2.05) | (-0.95) | (-0.59) |
| Turnover | -0.002* | -0.002 | -0.066*** | -0.069*** |
| | (-1.73) | (-1.61) | (-8.49) | (-8.48) |
| Fund Flows (%) | -0.000 | -0.000 | 0.000* | 0.001*** |
| | (-0.92) | (-1.35) | (1.92) | (2.67) |
| Active Share | 0.358*** | 0.371*** | -0.696*** | -0.764*** |
| | (49.71) | (50.02) | (-15.34) | (-16.32) |
| Past Performance | 0.000 | 0.000** | -0.002*** | -0.002*** |
| | (1.28) | (2.24) | (-3.54) | (-5.09) |
| ESG Unrated Weight | 0.312*** | 0.279*** | -2.421*** | -2.312*** |
| | (5.45) | (5.05) | (-6.70) | (-6.76) |
| ESG Ratings Disagreement | -0.008* | -0.006 | -0.201*** | -0.232*** |
| | (-1.69) | (-1.13) | (-6.61) | (-7.03) |
| Time FE | Yes | No | Yes | No |
| Style FE | Yes | No | Yes | No |
| Time x Style FE | No | Yes | No | Yes |
| Observations | 64,108 | 64,100 | 64,108 | 64,100 |
| Adjusted $R^2$ | 0.403 | 0.428 | 0.180 | 0.224 |

**Table 3: Fund performance and ESG investing – Panel regression analysis**

This table reports estimates from regressing a fund's performance on its portfolio-level ESG characteristics. Stock-level ESG data is from MSCI. The time period of analysis is January 2004 through June 2021. Performance is measured as the fund's quarterly gross benchmark-adjusted return. Coefficients associated with the control variables are, for brevity, suppressed. We adjust for serial correlation by clustering the standard errors associated with the coefficients at the year-quarter level. *t*-statistics associated with those standard errors are reported below the corresponding coefficients in parentheses. * denotes statistical significance at the 10% level, ** denotes at the 5% level, and *** denotes at the 1% level.

| | Fund Performance | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| ESG Fund | 0.175 | -1.033* | -1.050* | 0.198 | 0.051 | 0.046 |
| | (0.97) | (-1.69) | (-1.74) | (1.17) | (0.24) | (0.22) |
| ESG Fund × Active ESG Share | | 8.064** | 8.113** | | | |
| | | (2.33) | (2.37) | | | |
| ESG Fund × Directional ESG | | | | | -1.726* | -1.734* |
| | | | | | (-1.90) | (-1.98) |
| Active ESG Share | 0.306 | -0.821 | -1.499 | | | |
| | (0.13) | (-0.33) | (-0.96) | | | |
| Directional ESG | | | | -0.530 | -0.264 | -0.239 |
| | | | | (-0.57) | (-0.26) | (-0.26) |
| Active Share | | | 0.756 | | | 0.263 |
| | | | (0.34) | | | (0.14) |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Time x Style FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 68,171 | 68,171 | 68,171 | 68,171 | 68,171 | 68,171 |
| Adjusted $R^2$ | 0.130 | 0.130 | 0.130 | 0.130 | 0.130 | 0.130 |

**Table 4: Fund performance and ESG investing – Time-series variation**

This table reports estimates from regressing a fund's performance on its portfolio-level ESG characteristics. Stock-level ESG data is from MSCI. The estimations are performed separately in three distinct periods (Q1 2004 through Q4 2009, Q1 2010 through Q4 2015, and Q1 2016 through Q2 2021). Performance is measured as the fund's quarterly gross benchmark-adjusted return. Coefficients associated with the control variables are, for brevity, suppressed. We adjust for serial correlation by clustering the standard errors associated with the coefficients at the year-quarter level. *t*-statistics associated with those standard errors are reported below the corresponding coefficients in parentheses. * denotes statistical significance at the 10% level, ** denotes at the 5% level, and *** denotes at the 1% level.

| | Fund Performance | | | | | |
|---|---|---|---|---|---|---|
| Time Period Start | Q1 2004 | Q1 2010 | Q1 2016 | Q1 2004 | Q1 2010 | Q1 2016 |
| Time Period End | Q4 2009 | Q4 2015 | Q2 2021 | Q4 2009 | Q4 2015 | Q2 2021 |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| ESG Fund | 0.716 | -0.388 | -2.703** | 0.395* | 0.339 | -0.316 |
| | (1.41) | (-1.08) | (-2.21) | (1.89) | (1.41) | (-0.86) |
| ESG Fund × Active ESG Shr. | -0.658 | 5.148*** | 17.626** | | | |
| | (-0.17) | (3.04) | (2.46) | | | |
| ESG Fund × Directional ESG | | | | -1.140 | -0.908 | -2.832 |
| | | | | (-1.05) | (-1.21) | (-1.37) |
| Active ESG Share | 6.476 | -1.481 | -7.725* | | | |
| | (1.27) | (-0.53) | (-1.85) | | | |
| Directional ESG | | | | -0.557 | -0.739 | 0.817 |
| | | | | (-0.34) | (-0.61) | (0.33) |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Time x Style FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 19,825 | 23,842 | 24,504 | 19,825 | 23,842 | 24,504 |
| Adjusted $R^2$ | 0.119 | 0.179 | 0.111 | 0.118 | 0.180 | 0.109 |

**Table 5: Fund performance and ESG investing – Level of disagreement in ESG ratings**
This table reports estimates from regressing a fund's performance on its portfolio-level ESG characteristics. The estimations are performed separately depending on whether the fund's ESG Ratings Disagreement is above or below median. Active ESG Share and Directional ESG are, in this test, estimated using a combination of stock-level ESG data from KLD, TVL, and MSCI. The time period of analysis is January 2004 through June 2021. Performance is measured as the fund's quarterly gross benchmark-adjusted return. Coefficients associated with the control variables are, for brevity, suppressed. We adjust for serial correlation by clustering the standard errors associated with the coefficients at the year-quarter level. *t*-statistics associated with those standard errors are reported below the corresponding coefficients in parentheses. * denotes statistical significance at the 10% level, ** denotes at the 5% level, and *** denotes at the 1% level.

| | Fund Performance | | | |
|---|---|---|---|---|
| | Above Median ESG Ratings Disagreement | | Below Median ESG Ratings Disagreement | |
| | (1) | (2) | (3) | (4) |
| ESG Fund | -1.327* | 0.286 | -0.086 | 0.018 |
| | (-1.67) | (1.43) | (-0.22) | (0.09) |
| ESG Fund × Active ESG Share | 12.361** | | 0.859 | |
| | (2.30) | | (0.36) | |
| ESG Fund × Directional ESG | | -3.588** | | -0.779 |
| | | (-2.02) | | (-0.91) |
| Active ESG Share | -2.124 | | -2.423 | |
| | (-0.92) | | (-1.08) | |
| Directional ESG | | -0.910 | | -0.902 |
| | | (-0.56) | | (-0.90) |
| Controls | Yes | Yes | Yes | Yes |
| Time x Style FE | Yes | Yes | Yes | Yes |
| Observations | 34,453 | 34,453 | 34,473 | 34,473 |
| Adjusted $R^2$ | 0.148 | 0.149 | 0.134 | 0.134 |

**Table 6: Fund performance and ESG investing – Disaggregating E, S, and G**

This table reports estimates from regressing a fund's performance on its portfolio-level ESG characteristics. The E, S, and G components, estimated using stock-level ESG data from KLD, are each treated separately. The time period of analysis is January 2004 through June 2021. Performance is measured as the fund's quarterly gross benchmark-adjusted return. Coefficients associated with the control variables are, for brevity, suppressed. We adjust for serial correlation by clustering the standard errors associated with the coefficients at the year-quarter level. *t*-statistics associated with those standard errors are reported below the corresponding coefficients in parentheses. * denotes statistical significance at the 10% level, ** denotes at the 5% level, and *** denotes at the 1% level.

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| ESG Fund | -0.989* | -0.747 | -0.359 | 0.095 | -0.030 | 0.120 |
| | (-1.72) | (-1.43) | (-1.09) | (0.53) | (-0.13) | (0.72) |
| ESG Fund × Active E Share | 7.666** | | | | | |
| | (2.32) | | | | | |
| ESG Fund × Active S Share | | 4.299* | | | | |
| | | (1.97) | | | | |
| ESG Fund × Active G Share | | | 4.748** | | | |
| | | | (2.01) | | | |
| ESG Fund × Directional E | | | | -1.704** | | |
| | | | | (-2.18) | | |
| ESG Fund × Directional S | | | | | -0.959** | |
| | | | | | (-2.14) | |
| ESG Fund × Directional G | | | | | | -0.278 |
| | | | | | | (-0.25) |
| Active E Share | 0.137 | | | | | |
| | (0.05) | | | | | |
| Active S Share | | -2.825** | | | | |
| | | (-2.01) | | | | |
| Active G Share | | | -0.521 | | | |
| | | | (-0.22) | | | |
| Directional E | | | | -0.475 | | |
| | | | | (-0.50) | | |
| Directional S | | | | | -0.394 | |
| | | | | | (-0.95) | |
| Directional G | | | | | | 0.824 |
| | | | | | | (0.59) |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Time x Style FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 66,371 | 66,371 | 66,371 | 66,371 | 66,371 | 66,371 |
| Adjusted $R^2$ | 0.131 | 0.131 | 0.131 | 0.131 | 0.131 | 0.131 |

**Table 7: Fund performance and ESG investing – Portfolio analysis**

This table reports annualized gross performance for equal-weight monthly-rebalanced portfolios of mutual funds. The portfolios are formed by independently double sorting funds into quintiles based on an ESG metric and into two groups based on whether the fund is an ESG fund. For the ESG metric, Panel A uses Active ESG Share, and Panel B uses Directional ESG. Both measures use stock-level ESG data from MSCI. For brevity, only the results for the lowest and highest quintiles of a given ESG metric are reported. Performance is measured using benchmark-adjusted returns and CAPM, FFC4, and CPZ4 alphas. The time period is January 2010 through June 2021. *t*-statistics are reported below the corresponding values in parentheses. * denotes statistical significance at the 10% level, ** denotes at the 5% level, and *** denotes at the 1% level.

*Panel A: Active ESG Share*

| | Benchmark-Adjusted | | | CAPM Alpha | | | FFC4 Alpha | | | CPZ4 Alpha | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Low | High | H − L | Low | High | H − L | Low | High | H − L | Low | High | H − L |
| Non-ESG | -0.25 | -1.24* | -0.99* | -1.59 | -1.96** | -0.37 | -0.58 | -1.23* | -0.66 | -0.03 | -0.81 | -0.78 |
| | (-0.89) | (-1.80) | (-1.92) | (-1.62) | (-2.17) | (-0.73) | (-0.90) | (-1.91) | (-1.28) | (-0.06) | (-1.32) | (-1.55) |
| ESG | -0.27 | -0.32 | -0.04 | -1.84** | -0.26 | 1.58** | -1.01 | -0.14 | 0.88 | -0.50 | 0.27 | 0.78 |
| | (-0.86) | (-0.43) | (-0.07) | (-1.99) | (-0.33) | (2.06) | (-1.60) | (-0.20) | (1.27) | (-0.91) | (0.39) | (1.12) |
| ESG − Non | -0.02 | 0.93*** | 0.95** | -0.25 | 1.70*** | 1.95*** | -0.44 | 1.10*** | 1.53*** | -0.47 | 1.09*** | 1.56*** |
| | (-0.09) | (2.70) | (2.18) | (-0.89) | (3.54) | (3.72) | (-1.45) | (3.07) | (3.14) | (-1.55) | (2.86) | (3.07) |

*Panel B: Directional ESG*

| | Benchmark-Adjusted | | | CAPM Alpha | | | FFC4 Alpha | | | CPZ4 Alpha | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Low | High | H − L | Low | High | H − L | Low | High | H − L | Low | High | H − L |
| Non-ESG | -1.12 | -0.48 | 0.64 | -2.10** | -1.13 | 0.97 | -1.77** | -0.19 | 1.58* | -1.42* | 0.34 | 1.76** |
| | (-1.24) | (-1.21) | (0.60) | (-2.14) | (-1.30) | (1.15) | (-2.16) | (-0.30) | (1.84) | (-1.82) | (0.64) | (2.27) |
| ESG | -0.02 | -0.91** | -0.89 | -0.33 | -0.82 | -0.50 | -0.60 | -0.11 | 0.48 | -0.27 | 0.27 | 0.54 |
| | (-0.02) | (-2.21) | (-0.91) | (-0.31) | (-1.24) | (-0.48) | (-0.61) | (-0.21) | (0.50) | (-0.29) | (0.56) | (0.62) |
| ESG − Non | 1.10*** | -0.43 | -1.53** | 1.78*** | 0.31 | -1.47*** | 1.17*** | 0.08 | -1.09** | 1.14*** | -0.08 | -1.22** |
| | (2.88) | (-1.05) | (-2.33) | (4.07) | (0.79) | (-3.06) | (3.45) | (0.24) | (-2.45) | (3.17) | (-0.24) | (-2.61) |

**Table 8: Flow-performance relation and ESG investing**

This table reports estimates from regressing a fund's quarterly net flow on its past performance and portfolio-level ESG characteristics for two subsamples: ESG Funds and Non-ESG Funds. Stock-level ESG data is from MSCI. The time period of analysis is January 2004 through June 2021. Past performance is estimated using piecewise metrics calculated following Sirri and Tufano (1998). Coefficients associated with the control variables, when they are included in the model, are, for brevity, suppressed. Low and High Active ESG and Directional ESG are indicator variables for below and average median values. We adjust for serial correlation by clustering the standard errors associated with the coefficients at the fund level. *t*-statistics associated with those standard errors are reported below the corresponding coefficients in parentheses. * denotes statistical significance at the 10% level, ** denotes at the 5% level, and *** denotes at the 1% level.

| | Fund Flows | | | |
|---|---|---|---|---|
| | ESG Funds | | Non-ESG Funds | |
| | (1) | (2) | (3) | (4) |
| Low Active ESG × Low Rank | -0.410 | | 3.199*** | |
| | (-0.16) | | (3.04) | |
| High Active ESG × Low Rank | 4.873** | | 3.396*** | |
| | (1.99) | | (3.23) | |
| Low Active ESG × Mid Rank | 0.715 | | 0.671** | |
| | (0.88) | | (2.27) | |
| High Active ESG × Mid Rank | 0.533 | | 0.761** | |
| | (0.69) | | (2.43) | |
| Low Active ESG × High Rank | 9.230** | | 8.463*** | |
| | (2.10) | | (4.80) | |
| High Active ESG × High Rank | 6.592* | | 9.424*** | |
| | (1.79) | | (5.84) | |
| Low Directional ESG × Low Rank | | 1.253 | | 3.267*** |
| | | (0.48) | | (2.98) |
| High Directional ESG × Low Rank | | 2.793 | | 3.328*** |
| | | (1.12) | | (3.22) |
| Low Directional ESG × Mid Rank | | 0.806 | | 0.760** |
| | | (1.04) | | (2.36) |
| High Directional ESG × Mid Rank | | 0.452 | | 0.656** |
| | | (0.64) | | (2.20) |
| Low Directional ESG × High Rank | | 8.364** | | 9.295*** |
| | | (2.00) | | (5.33) |
| High Directional ESG × High Rank | | 8.373** | | 9.002*** |
| | | (2.24) | | (5.20) |
| Controls | No | Yes | No | Yes |
| Time x Style FE | Yes | Yes | Yes | Yes |
| Observations | 8782 | 8782 | 55386 | 55386 |
| Adjusted $R^2$ | 0.109 | 0.108 | 0.090 | 0.090 |

# Internet Appendix
# The complex materiality of ESG ratings: Evidence from ESG funds

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**Table IA.1: Fund performance and ESG investing – TVL data**

This table reports estimates from regressing a fund's performance on its portfolio-level ESG characteristics, with stock-level ESG determined using TVL data, rather than MSCI data. The time period of analysis is April 2008 through June 2021. Performance is measured as the fund's quarterly gross benchmark-adjusted return. Coefficients associated with the control variables are, for brevity, suppressed. We adjust for serial correlation by clustering the standard errors associated with the coefficients at the year-quarter level. *t*-statistics associated with those standard errors are reported below the corresponding coefficients in parentheses. * denotes statistical significance at the 10% level, ** denotes at the 5% level, and *** denotes at the 1% level.

| | Fund Performance | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| ESG Fund | 0.104 | -0.850 | -0.853 | 0.104 | 0.047 | 0.051 |
| | (0.52) | (-1.57) | (-1.58) | (0.51) | (0.22) | (0.23) |
| ESG Fund × Active ESG Share | | 9.016** | 8.994** | | | |
| | | (2.18) | (2.16) | | | |
| ESG Fund × Directional ESG | | | | | 1.411 | 1.413 |
| | | | | | (1.14) | (1.15) |
| Active ESG Share | -3.231 | -4.439 | -4.858*** | | | |
| | (-1.18) | (-1.58) | (-3.25) | | | |
| Directional ESG | | | | -0.457 | -0.670 | -0.646 |
| | | | | (-0.51) | (-0.81) | (-0.71) |
| Active Share | | | 0.511 | | | -0.332 |
| | | | (0.18) | | | (-0.11) |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Time x Style FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 55,543 | 55,543 | 55,543 | 55,543 | 55,543 | 55,543 |
| Adjusted $R^2$ | 0.128 | 0.128 | 0.128 | 0.127 | 0.127 | 0.127 |

**Table IA.2: Fund performance and ESG investing – KLD data**

This table reports estimates from regressing a fund's performance on its portfolio-level ESG characteristics, with stock-level ESG determined using KLD data, rather than MSCI data. The time period of analysis is January 2004 through June 2021. Performance is measured as the fund's quarterly gross benchmark-adjusted return. Coefficients associated with the control variables are, for brevity, suppressed. We adjust for serial correlation by clustering the standard errors associated with the coefficients at the year-quarter level. *t*-statistics associated with those standard errors are reported below the corresponding coefficients in parentheses. * denotes statistical significance at the 10% level, ** denotes at the 5% level, and *** denotes at the 1% level.

| | Fund Performance | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| ESG Fund | 0.172 | -1.431** | -1.440** | 0.207 | 0.065 | 0.059 |
| | (0.97) | (-2.14) | (-2.17) | (1.29) | (0.33) | (0.31) |
| ESG Fund × Active ESG Share | | 7.165*** | 7.144*** | | | |
| | | (2.76) | (2.73) | | | |
| ESG Fund × Directional ESG | | | | | -0.786** | -0.789** |
| | | | | | (-2.20) | (-2.24) |
| Active ESG Share | 0.429 | -0.475 | -1.609 | | | |
| | (0.21) | (-0.23) | (-0.97) | | | |
| Directional ESG | | | | -0.345 | -0.226 | -0.215 |
| | | | | (-0.95) | (-0.64) | (-0.63) |
| Active Share | | | 1.237 | | | 0.345 |
| | | | (0.45) | | | (0.16) |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Time x Style FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 68,959 | 68,959 | 68,959 | 68,959 | 68,959 | 68,959 |
| Adjusted $R^2$ | 0.129 | 0.130 | 0.130 | 0.130 | 0.130 | 0.130 |

**Table IA.3: Fund performance and ESG investing – Active share interaction**

This table reports estimates from regressing a fund's performance on its portfolio-level ESG characteristics. Stock-level ESG data is from MSCI. The time period of analysis is January 2004 through June 2021. Performance is measured as the fund's quarterly gross benchmark-adjusted return. Coefficients associated with the control variables are, for brevity, suppressed. We adjust for serial correlation by clustering the standard errors associated with the coefficients at the year-quarter level. *t*-statistics associated with those standard errors are reported below the corresponding coefficients in parentheses. * denotes statistical significance at the 10% level, ** denotes at the 5% level, and *** denotes at the 1% level.

| | Fund Performance | | |
|---|---|---|---|
| | (1) | (2) | (3) |
| ESG Fund | -0.604 | -0.507 | -0.464 |
| | (-0.67) | (-0.57) | (-0.53) |
| ESG Fund × Active ESG Share | | 8.097** | |
| | | (2.18) | |
| ESG Fund × Directional ESG | | | -1.711* |
| | | | (-1.96) |
| ESG Fund × Active Share | 1.005 | -0.720 | 0.672 |
| | (0.88) | (-0.65) | (0.59) |
| Active ESG Share | | -2.213 | |
| | | (-1.59) | |
| Directional ESG | | | -0.243 |
| | | | (-0.27) |
| Active Share | 0.736 | 1.379 | 0.180 |
| | (0.32) | (0.63) | (0.10) |
| Controls | Yes | Yes | Yes |
| Time x Style FE | Yes | Yes | Yes |
| Observations | 68,970 | 68,970 | 68,970 |
| Adjusted $R^2$ | 0.130 | 0.130 | 0.130 |

**Table IA.4: Fund performance and ESG investing – Combined data**

This table reports estimates from regressing a fund's performance on its portfolio-level ESG characteristics, with stock-level ESG determined using a combination of MSCI, KLD, and TVL data, rather than MSCI data alone. The time period of analysis is January 2004 through June 2021. Performance is measured as the fund's quarterly gross benchmark-adjusted return. Coefficients associated with the control variables are, for brevity, suppressed. We adjust for serial correlation by clustering the standard errors associated with the coefficients at the year-quarter level. *t*-statistics associated with those standard errors are reported below the corresponding coefficients in parentheses. * denotes statistical significance at the 10% level, ** denotes at the 5% level, and *** denotes at the 1% level.

| | Fund Performance | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| ESG Fund | 0.173 | -0.646 | -0.670 | 0.223 | 0.131 | 0.127 |
| | (0.96) | (-1.20) | (-1.25) | (1.34) | (0.68) | (0.67) |
| ESG Fund × Active ESG Share | | 5.918* | 5.998* | | | |
| | | (1.83) | (1.86) | | | |
| ESG Fund × Directional ESG | | | | | -2.154* | -2.163* |
| | | | | | (-1.85) | (-1.92) |
| Active ESG Share | 0.340 | -0.482 | -1.518 | | | |
| | (0.13) | (-0.18) | (-0.85) | | | |
| Directional ESG | | | | -1.365 | -1.042 | -1.015 |
| | | | | (-1.19) | (-0.85) | (-0.93) |
| Active Share | | | 1.126 | | | 0.222 |
| | | | (0.50) | | | (0.11) |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Time x Style FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 68,970 | 68,970 | 68,970 | 68,970 | 68,970 | 68,970 |
| Adjusted $R^2$ | 0.130 | 0.130 | 0.130 | 0.130 | 0.130 | 0.130 |

**Table IA.5: Fund performance and ESG investing – Impact of fund family**

This table reports estimates from regressing a fund's performance on its portfolio-level ESG characteristics. Stock-level ESG data is from MSCI. The time period of analysis is January 2004 through June 2021. Performance is measured as the fund's quarterly gross benchmark-adjusted return. The deviation from our base analysis is adding fund family fixed effects to the model specification. Coefficients associated with the control variables are, for brevity, suppressed. We adjust for serial correlation by clustering the standard errors associated with the coefficients at the year-quarter level. *t*-statistics associated with those standard errors are reported below the corresponding coefficients in parentheses. * denotes statistical significance at the 10% level, ** denotes at the 5% level, and *** denotes at the 1% level.

| | Fund Performance | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| ESG Fund | 0.381** | -0.772 | -0.858 | 0.406** | 0.231 | 0.168 |
| | (2.01) | (-1.37) | (-1.54) | (2.27) | (1.14) | (0.84) |
| ESG Fund × Active ESG Share | | 7.828** | 8.108** | | | |
| | | (2.28) | (2.40) | | | |
| ESG Fund × Directional ESG | | | | | -1.659** | -1.696** |
| | | | | | (-2.12) | (-2.21) |
| Active ESG Share | 1.549 | 0.413 | -1.436 | | | |
| | (0.69) | (0.17) | (-0.85) | | | |
| Directional ESG | | | | -0.401 | -0.136 | 0.062 |
| | | | | (-0.47) | (-0.15) | (0.08) |
| Active Share | | | 2.692 | | | 2.395 |
| | | | (1.03) | | | (1.09) |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Time x Style FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Family FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 68,169 | 68,169 | 68,169 | 68,169 | 68,169 | 68,169 |
| Adjusted $R^2$ | 0.142 | 0.142 | 0.143 | 0.142 | 0.142 | 0.143 |

**Table IA.6: Fund performance and ESG investing – Switching to net returns**

This table reports estimates from regressing a fund's performance on its portfolio-level ESG characteristics. Stock-level ESG data is from MSCI. The time period of analysis is January 2004 through June 2021. The deviation from our base analysis is switching the fund performance metric from gross benchmark-adjusted returns to net benchmark-adjusted returns. Coefficients associated with the control variables are, for brevity, suppressed. We adjust for serial correlation by clustering the standard errors associated with the coefficients at the year-quarter level. *t*-statistics associated with those standard errors are reported below the corresponding coefficients in parentheses. * denotes statistical significance at the 10% level, ** denotes at the 5% level, and *** denotes at the 1% level.

| | Fund Performance (Net) | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| ESG Fund | 0.184 | -1.019 | -1.033* | 0.207 | 0.060 | 0.057 |
| | (1.03) | (-1.66) | (-1.71) | (1.23) | (0.29) | (0.28) |
| ESG Fund × Active ESG Share | | 8.025** | 8.069** | | | |
| | | (2.32) | (2.36) | | | |
| ESG Fund × Directional ESG | | | | | -1.715* | -1.721* |
| | | | | | (-1.90) | (-1.97) |
| Active ESG Share | 0.224 | -0.897 | -1.513 | | | |
| | (0.09) | (-0.36) | (-0.97) | | | |
| Directional ESG | | | | -0.524 | -0.260 | -0.242 |
| | | | | (-0.56) | (-0.26) | (-0.27) |
| Active Share | | | 0.687 | | | 0.184 |
| | | | (0.31) | | | (0.10) |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Time x Style FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 68,171 | 68,171 | 68,171 | 68,171 | 68,171 | 68,171 |
| Adjusted $R^2$ | 0.130 | 0.130 | 0.130 | 0.130 | 0.130 | 0.130 |

**Table IA.7: Fund performance and ESG investing – Switching to factor models**

This table reports estimates from regressing a fund's performance on its portfolio-level ESG characteristics. Stock-level ESG data is from MSCI. The time period of analysis is January 2004 through June 2021. The deviation from our base analysis is switching the fund performance metric from gross benchmark-adjusted returns to gross factor model alphas (either CAPM, FFC4, or CPZ4). Coefficients associated with the control variables are, for brevity, suppressed. We adjust for serial correlation by clustering the standard errors associated with the coefficients at the year-quarter level. *t*-statistics associated with those standard errors are reported below the corresponding coefficients in parentheses. * denotes statistical significance at the 10% level, ** denotes at the 5% level, and *** denotes at the 1% level.

| | Fund Performance | | | | | |
|---|---|---|---|---|---|---|
| | CAPM | FFC4 | CPZ4 | CAPM | FFC4 | CPZ4 |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| ESG Fund | -1.344 | -1.158** | -1.158*** | 0.066 | -0.010 | 0.166 |
| | (-1.67) | (-2.44) | (-2.84) | (0.23) | (-0.05) | (0.91) |
| ESG Fund × Active ESG Share | 11.151** | 9.262*** | 10.285*** | | | |
| | (2.36) | (3.30) | (3.74) | | | |
| ESG Fund × Directional ESG | | | | -2.405* | -2.443*** | -2.127*** |
| | | | | (-1.76) | (-3.19) | (-3.09) |
| Active ESG Share | -2.580 | -0.841 | -0.380 | | | |
| | (-0.69) | (-0.38) | (-0.18) | | | |
| Directional ESG | | | | 1.615 | 1.123 | 1.177 |
| | | | | (1.19) | (1.40) | (1.53) |
| Active Share | -1.344 | -1.158** | -1.158*** | 0.066 | -0.010 | 0.166 |
| | (-1.67) | (-2.44) | (-2.84) | (0.23) | (-0.05) | (0.91) |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Time x Style FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 68,171 | 68,171 | 68,171 | 68,171 | 68,171 | 68,171 |
| Adjusted $R^2$ | 0.476 | 0.179 | 0.169 | 0.476 | 0.179 | 0.169 |