Corporate ESG Profiles and Investor Horizons*

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Abstract

We consider motivations for institutional investors to prefer firms with higher Environmental, Social and Governance (ESG) profiles. We find that such preferences depend critically on investor horizons: Investors with longer horizons tend to prefer higher ESG firms significantly more than do short-term investors. Consistent with the importance of investor horizon, we find that investors behave more patiently toward the high ESG firms in their portfolios as compared to their other holdings, selling relatively less after negative earnings surprises or poor stock returns. We further support these findings using changes in the FTSE4Good US Index as shocks to firms' ESG reputations.

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1 Introduction

Increasingly, corporations have been reporting integration of Environmental, Social, and Governance (ESG) issues into their business models. Concurrently, a growing number of institutional investors have been voicing their support for ESG issues and incorporating them into their investment decision-making. Many of these investors argue that ESG issues, such as climate change, workplace diversity, and supply-chain human rights, affect firms' risks and returns (e.g., Dunn, Fitzgibbons, and Pomorski (2018)). Similarly, in his 2016 letter to corporate leaders, Laurence Fink, the CEO of Blackrock, states: "Over the long-term, Environmental, Social and Governance (ESG) issues - ranging from climate change to diversity to board effectiveness - have real and quantifiable financial impacts."[1]

However, the extent to which institutional investors have actually converted their advocacy and commitments into their portfolio holdings and the rationales for doing so remain unclear. Common explanations center on the idea that firms with better ESG practices increase firm value through a variety of channels, such as by avoiding myopic decisions and strengthening market positions (Bénabou and Tirole (2010)), attracting customers and providing employees with incentives for greater productivity (Baron (2008), Baron (2001)),or decreasing firm risk (Albuquerque, Koskinen, and Zhang (2017)). Consistent with these arguments, as indicated by Laurence Fink's comment to portfolio companies quoted above, many practitioners believe that ESG pays off in the long term and thus is more valued by long-term investors.[2]

In this paper, we consider the relation between investor horizon and corporate ESG profiles. That is, we argue that investor horizon should be an important determinant of investor decisions regarding the ESG profiles of their portfolios. Extant literature

[1] https://www.businessinsider.com/blackrock-ceo-larry-fink-letter-to-sp-500-ceos-2016-2

[2] Mr. Fink further stated in his 2017 letter to corporate leaders: Environmental, Social and Governance (ESG) factors relevant to a company's business can provide essential insights into management effectiveness and thus a company's long-term prospects." http://www.businessinsider.com/blackrock-ceo-larry-fink-letter-to-ceos-2017-1.

suggests that many ESG practices, such as curbing environmental pollution, building up employee trust, and securing ethical supplier relationships, contribute to the improvement of firm performance, lowering of cost of capital and reduction of litigation risks in the long-run (e.g. Humphrey, Lee, and Shen (2012), Eccles, Ioannou, and Serafeim (2014), El Ghoul, Guedhami, Kwok, and Mishra (2011)). It can be costly, however, for firms to implement ESG strategies, resulting in a sacrifice of short-term earnings for long-term outcomes. Therefore, investors with different time horizons may disagree on the value of ESG projects. For example, in Bolton, Scheinkman, and Xiong (2006), short-term earnings have a speculative component that can induce price bubbles in the near term. Shareholders who benefit more from near-term stock price appreciation would then encourage managers to boost short-term earnings, even at the expense of long-term value. Alternatively, long-term and short-term investors may simply have divergent evaluations of ESG projects due to asymmetric information: in Froot, Perold, and Stein (1992), short-term investors endogenously choose to learn information pertaining to day-to-day trading and hence know less about long-term projects such as ESG investments. These explanations suggest differences exist between long-term and short-term investors in their preferences toward high ESG firms. We test these hypotheses in the data.

Our empirical results support our hypotheses and indicate that investor preferences for corporate ESG depend critically on their investment horizons: investors with longer horizons tend to prefer higher-ESG firms in contrast to short-term investors' preferences. We employ two measures of investment horizon, reported mutual fund portfolio turnover ratios and institutional investor churn ratios derived from portfolio holdings (Gaspar, Massa, and Matos (2005)) and document that mutual funds and 13f institutions with longer horizons have stronger preferences for high ESG firms.[3]

[3]We also find that these results are not driven by the small number of SRI funds in our sample. In addition, using a further differentiation among institutional investors that relies heavily on investment horizons (the Bushee (1998) categorization of dedicated investors, quasi-indexers, and transient investors), we find that his long-term category, the dedicated investors, have also been

The apparent match between shareholder investment horizons and firm ESG activities not only supports the hypothesis that long-term investors prefer high ESG profile firms, suggesting long-term value effects of corporate ESG, but it also provides a more nuanced view on the relationship between institutional investor presence in a firm and corporate short-termism. The relationship explains seemingly conflicting evidence in the financial press. On the one hand, many allege that institutional investors exert pressure on corporate managers to beat their quarterly earnings expectations, hindering the managers' ability to implement long-term strategies (Pozen (2009)). On the other hand, some institutional investors are vocal in encouraging the managers of their portfolio firms to take a longer-term view. For example, a group of the world's largest institutional investors concerned about the myopia of their portfolio firms' managers reportedly met to develop "proposals to improve company governance that would encourage longer-term investment and reduce friction with shareholders" (Foley and McLannahan (2016)).

An implication of the link between long-term investors and high ESG firms is that the investors should be more patient toward these firms when the firms encounter shorter-term problems. If investors understand that high ESG firms engage in business activities that benefit shareholders in the long-run, they would tend to refrain from selling their positions if the company underperforms in the short-run. To test this hypothesis, we examine conditions under which institutional investors sell their positions in a firm following a negative earnings surprise or a period of poor stock returns. We find that, in general, the institutional investors in our sample tend to sell portfolio holdings following negative earnings surprises or poor stock returns. However, comparing positions of the *same* investor across different portfolio firms, the sensitivity of the institutional selling is significantly reduced for firms with higher ESG scores. Consistent with our hypothesis, these results indicate that investors

increasing their holdings of high ESG firms.

behave more patiently toward high ESG firms, suggesting the investors believe that these firms are in a position to create value in the long-run.

To better identify a potential causal relationship between firms' ESG activities and institutional investor behavior, we consider a shock that can change investors' considerations of a firm's ESG reputation. The shock we examine is the FTSE4Good US Index biannual rebalance in which a firm is added or eliminated from the Index due to a re-assessment by FTSE-Russell of the firm's ESG profile relative to other firms. Since FTSE4Good is an established index that specializes in corporate ESG issues, we expect the inclusion and exclusion events carry information with respect to firms' ESG reputations. More importantly, the responses of long-term investors to rebalance news should be more pronounced than the responses of other investors, since ESG considerations carry more weight for long-term investors. Indeed, the results indicate that stocks included into (excluded from) the index experience an increase (decrease) in long-term investor ownership relative to other investors' ownership, both among mutual funds and 13f institutions. The differential behavior between long-term investors and other investors is robust when we compare inclusion (exclusion) stocks with matched control stocks with similar characteristics in a triple-differences setting.

A further implication for shocks induced by FTSE4Good Index rebalance is that, when a firm is included into (dropped from) the Index for ESG reasons, investors would become more (less) patient toward it. Consistent with that hypothesis, investors' trading patterns around earnings surprises change after the rebalance. For firms that are included into (excluded from) the FTSE4Good Index, the sensitivity of selling trades with respect to negative earnings surprises decreases (increases) significantly. Since the comparison is made for the same firm shortly before and after the Index rebalance events, the difference between investors trading behavior can be attributed to their changed perception about the ESG profile of their portfolio companies. Thus, it appears that institutional investors are inclined to give corporate

managers a longer potential redemption period following earnings shortfalls if the company is deemed to have an enhanced ESG reputation.

Our research brings into focus the interrelated themes of ESG-investing and corporate short-termism. We contribute to the growing debate on whether corporate managers in the US have become too short-term oriented and take myopic actions that hurt long-term shareholder value. Although we do not take an explicit stance on the welfare implications of long-termism versus short-termism, we offer empirical support for the perspective that shareholders' heterogeneous horizons are important in influencing corporate short-termism.[4] Bolton et al. (2006) theorize that, in the presence of speculative stock markets, short-term and long-term shareholders' optimal strategies diverge and short-term shareholders incentivize corporate managers to take myopic actions. Our finding that institutional investors with different investment horizons select into firms with high or low ESG profiles suggest that shareholder horizon is an important aspect in the fostering of more corporate ESG or long-term investments.

Our paper is also related to previous research on the relationship between institutional investors and firms' ESG profiles. In terms of the relationship between institutional investor ownership and firms' ESG scores, Gillan, Hartzell, Koch, and Starks (2010) provide evidence that over their time period 13f institutions hold fewer shares of firms that improve their social and environmental net scores. Nofsinger, Sulaeman, and Varma (2016) examine 13f institutional ownership and individual ES concerns and strengths. They find somewhat mixed relationships for strengths, but generally negative relationships between ownership and concerns. In particular, 13f institutions tend to avoid firms in which there are more ES concerns. The authors divide their sample into two subperiods but their results on changes over time have different implications from our own. Fernando, Sharfman, and Uysal (2009) focus

[4]For a theoretical example under which long-termism is efficient, see Stein (1989); For an example under which short-termism is efficient, see Thakor (2018).

on the KLD environmental ratings and categorize firms into green, gray, toxic and neutral. In their examinations of institutional ownership and these categories, the authors find that the 13f institutions avoid holding shares in companies that are in the extremes, that is, categorized as either green or toxic.

Two central differences exist between previous research on institutional investor preferences regarding firms' ESG profiles and our paper. First, our focus is on the relation between investors' investment horizons and their preferences for corporate ESG. As discussed earlier, a natural relationship exists between investors' long-term horizons and their desired ESG profiles for portfolio companies. Investors more concerned with firms' values in the long-run may be more drawn to high ESG firms, partially driving the observed increasing institutional ownership of high ESG firms. Second, we provide analyses of exogenous shocks to firms' ESG reputations. In studying the latter, our paper is also related to that of Krüger (2015) who examines market reactions to news that changes firms' CSR profiles. He finds strong negative reactions to negative events and weakly negative reactions to positive events. We take a different approach by analyzing rebalance events of the FTSE4Good Index and by examining investor reactions through changes in their portfolio holdings to these shocks. We find that investors tend to react negatively to negative events by selling their holdings, which would be consistent with the Krüger (2015) stock price reactions to such events. However, for the positive events in our tests, we either find a positive reaction (i.e., increased holdings) or no reaction, depending on the investor type. Our paper is also related to Dimson, Karakaş, and Li (2015) and Dyck, Lins, Roth, and Wagner (2018). The first paper presents empirical evidence on the engagement of one institutional investor in influencing firms's ESG activities and finds a significant success rate for such engagements. Our results imply that the investor should have a long-term focus. The second paper provides evidence that suggests that international investors influence the environmental and social performance of firms, particularly in countries

in which the social norms suggest greater environmental and social commitments.[5]

Overall our results provide evidence that ESG investing is of increasing importance to institutional investors, especially for investors with long-term investment horizons. The results also suggest that corporate ESG profiles impact investors' trading behaviors in a way that is consistent with the hypothesis that long-term investors foster long-term corporate strategies.

2 Data and variable constructions

2.1 Data sources

We gather data on quarterly mutual fund holdings from the Thomson Reuters s12 database, and holdings from the Thomson Reuters s34 database for institutions that file 13f forms with the SEC, over the 2000 to 2014 period. Mutual fund characteristics, such as TNA and turnover ratio, are collected from CRSP Mutual Fund database. We omit index funds and ETFs to include only actively-managed U.S. domestic mutual funds. [6] Our sample contains 3,367 distinct mutual funds.

Data on corporate ESG performance are obtained from the MSCI ESG STATs database. This database contains an annual set of positive and negative ESG indicators as assessed by MSCI. MSCI and its predecessors collect data from company disclosures, academic and government databases, and other sources and rate companies on a wide array of issues in the primary categories of environment, community, diversity, employee relations, human rights, products and corporate governance. Within each of these areas the MSCI uses a binary relative rating scale with a base of zero for neutral performance. The scores on each criterion are 1 or 0 for positive

[5] Liang and Renneboog (2017) provide evidence that country legal origin is important in explaining firms' social and environmental policies.

[6] We remove index funds from the mutual fund category by parsing fund names and removing funds that hold over 1,000 stocks.

performance indicators ("strengths"), and -1 or 0 for negative performance indicators ("concerns").[7] We aggregate the data items for a firm-year by summing all positive and negative indicators. In some of our specifications, we separate out the positive and negative indicators. We also construct an ESG x/ Governance measure that exclude governance strengths and concerns from the ESG measure, as well as indicators associated with specific industries (e.g. firearms, nuclear, tobacco). MSCI ESG data covers all firms in MSCI USA IMI index. During our sample period, the average number of firms in each cross section is approximately 2,000.

To measure the ESG preference for a mutual fund or a 13f institution, we calculate a value-weighted average ESG score for each of the portfolio companies. At firm-level, we measure a firm's institutional ownership by two major categories: (1) actively managed domestic equity mutual funds and (2) 13f institutions.The quarterly percentage ownership level is calculated as the aggregate shares held by all institutions in the particular category, scaled by the company's total shares outstanding. We also measure the relative number of institutional owners (ownership breadth as in Chen, Hong, and Stein (2002)) as the number of funds or institutions that hold the stock scaled by the total number of funds or institutions in that period. The breadth measure is intended to reflect the general appeal of a given stock to mutual fund managers or institutional investors. Our firm-level sample includes 21,378 firm-years from 2000 to 2014.

In order to understand whether mutual fund portfolio managers' trading patterns reveal greater tendencies toward short-term or long-term motives with respect to firms' ESG profiles, we examine the managers' selling behavior related to negative earnings surprises and stock return performance. We obtain the data on earnings and analyst forecasts from the IBES dataset. Stock return performance is measured by the sum of monthly raw returns during the previous 12 months.

[7] See "MSCI ESG KLD STATS: 1991-2014 Data Sets" data manual available on WRDS.

Throughout our paper, we control for a number of firm characteristics, including each firm's market capitalization, past 12-month return, return volatility, stock turnover ratio, and an S&P 500 Index constituency indicator (from the CRSP database). We also include the firm's book-to-market ratio, dividend yield, and gross profitability ratio from the Compustat database.

In order to measure shocks to a firm's ESG profile, we employ the semi-annual rebalance of the FTSE4Good US Index. A firm can be added to or deleted from the index either because its ESG profile is deemed by the FTSE as suitable (unsuitable) for the Index, or the firm is included or excluded from the wider "universe" index (for the FTSE4Good US Index, the universe index is FTSE US Index). We include only index rebalance events that concern whether or not a firm meets the ESG-related criteria. This procedure results in 153 inclusion events and 115 exclusion events over the period of 2003 to 2015.[8]

2.2 Measurement of investment horizons

For mutual funds, a natural way to estimate their investment horizons is to use their reported portfolio turnover ratio, which we obtain from the CRSP database. It is defined as the minimum of a mutual fund's security sales and purchases, scaled by total net assets. An alternative method to measure a mutual fund's revealed investment horizon is to use holdings data to examine how quickly the fund manager trades positions. Investors who trade more quickly are assumed to have a shorter investment horizon. Employing the procedure used by Gaspar et al. (2005), we calculate a "churn" ratio for each fund-quarter. The churn ratio ranges from 0 to 2, and a higher

[8]More information on the methodology of FTSE4Good Index can be found at http://www.ftse.com/products/indices/ftse4good

churn ratio indicates that the fund turns over its holdings faster:

$$CR_{j,t} = \frac{\sum_{i \in I} |Shares_{i,j,t} * P_{i,t} - Shares_{i,j,t-1} * P_{i,t}|}{\sum_{i \in I} (Shares_{i,j,t} * P_{i,t} + Shares_{i,j,t-1} * P_{i,t-1})/2}$$

where $Shares_{i,j,t}$ and $P_{i,t}$ denote the number of shares and price of company i held by fund j at quarter t. To smooth out measurement errors, the churn ratio of a fund-quarter is calculated as the moving-average churn ratio of the four trailing quarters.

One advantage of using churn ratios as estimates of investor horizon is that the calculation can be applied to all 13f institutions since most of them do not report turnover ratios. As an alternative measure of investment horizons for 13f institutions we employ Bushee (1998)'s classification. Based on his classification using portfolio turnover rates and portfolio diversification, Bushee groups institutional investors into three types: dedicated investors, transient investors, and quasi indexers.[9]

For our firm-level analyses, we calculate the weighted averages of the estimated investor horizons for each firm's mutual fund or 13f institutional shareholders. For example, we compute the firm-level mutual fund turnover ratio by aggregating the turnover measures from the funds that hold their shares. Specifically, for stock i at time t, we take a weighted average of the turnover ratios of all its holding mutual funds in set J, where we weight by the number of shares held by fund j:

$$Firm\text{-}level\ MF\ Turnover_i = \frac{\sum_{j \in J} (Turnover\ Ratio_{j,t} * Shares_{i,j,t})}{\sum_{j \in J} Shares_{i,j,t}}$$

Similarly, we construct firm-level mutual fund (or 13f institution) churn ratios by taking a weighted average of churn ratios across the mutual funds (13f institutions)

[9]We thank Professor Bushee for making his data available at http://acct.wharton.upenn.edu/faculty/bushee/IIclass.html

invested in a given firm, where the weighting is by the number of shares held:

$$\textit{Firm-level ChurnRatio}_i = \frac{\sum_{j \in J}(CR_{j,t} * Shares_{i,j,t})}{\sum_{j \in J} Shares_{i,j,t}}$$

Summary statistics are shown in Table 1. In Panel A, we tabulate fund-level characteristics. The average annual reported portfolio turnover ratio for active equity mutual funds is 0.76, indicating that on an annual basis they buy and sell about three-quarters of their portfolio holdings. We also find a wide range of turnover across the funds given that the standard deviation is 0.52. On a quarterly basis, the average mutual fund churn ratio is 0.41. We also include an indicator variable for whether a fund is an SRI fund according to lists from Bloomberg and Morningstar. Only 2% of our funds (145) have such a designation. Panel B tabulates the characteristics of 13f institutions.

Panel C reports the summary statistics at the firm-level. An average of 14.87% of their shares are held by mutual funds and 67.98% held by 13f institutions. On the firm level, we find that the average reported turnover ratio for mutual funds holding the firms' stock is 52%, indicating that funds holding larger numbers of shares tend to have lower portfolio turnover. Panel C also shows firm characteristics, such as market capitalization, book-to-market ratio, and stock return.

Panels A, B and C also report ESG scores on the fund, 13f institution and firm levels. At the fund level (in Panel A) the weighted-average ESG for their holdings is 0.66, which can be compared to the ESG score of the sample firms on average reported in Panel C to be -0.32, with a median of 0. On average, over our sample period, mutual funds are buying higher ESG score firms.

3 Investor horizon and ESG preferences

In this section, we test our hypotheses regarding the relation between investors' horizons and their preferences for corporate ESG. Theories suggest that an important determinant of investor preference for corporate ESG is investment horizon. While some investors pursue a short-term-oriented strategy designed to realize trading profits in relatively brief time windows, other investors allow more patience in their trading decisions which can consider share price appreciation over longer time horizons. Bolton et al. (2006), for example, propose a model under which short-term oriented shareholders promote policies aimed at boosting the speculative components of corporate earnings. Since some ESG activities could improve long-term corporate performance while incurring short-term costs, a natural wedge exists between the valuations of such projects from the perspective of short-term versus long-term investors. At the same time, ESG projects may be detrimental to short-term earnings, which create the most speculation, short-term shareholders may be inclined to avoid firms with more ESG activities. If this is valid, then we expect a matching between investor horizons and firm ESG profiles: long-term oriented investors are more likely to hold high ESG firms in their portfolios, and vice versa.

3.1 Institutional investors' revealed preference for Corporate ESG: Fund-level evidence

We first test whether the revealed preferences for corporate ESG derived from fund portfolio holdings are related to their investment horizons. We hypothesize that funds with longer investment horizons, proxied by lower turnover ratios or lower portfolio churn ratios, hold portfolio companies with higher ESG scores. To construct a test of the relation between preference for ESG stocks and investor horizon, we first sort actively-managed equity mutual funds in each cross-section into five quintile portfolios

based on their portfolio churn ratios. Mutual funds in Portfolio 1 have the lowest churn ratio, and are defined as "long-horizon" funds, while funds in Portfolio 5 have the highest churn ratio. We then tabulate an average fund-level ESG score for each of the five churn ratio-sorted fund groups, which is calculated as the value-weighted average ESG score of a fund's underlying portfolio companies. As Panel (a) of Figure 1 shows, there exists a monotonically decreasing relationship between fund churn ratios and fund-level ESG scores. Long-horizon funds (Portfolio 1) have the highest average ESG score of 0.91, while short-horizon funds (Portfolio 5) have an average ESG score of 0.42. The spread of ESG scores across groups is economically meaningful, as it represents 28% of the standard deviation of fund-level ESG scores $((0.91-0.42)/1.72)$.

The same pattern between investor horizons and holdings ESG is observed for 13f institutions as well. In Panel (b) of Figure 1, we sort 13f institutions into five portfolios based on their portfolio churn ratios. Long-horizon institutions, which have the lowest churn ratio, hold stocks with higher ESG scores than short-horizon institutions. The relation between churn ratios and holdings ESG scores is monotonically decreasing. Evidence from both mutual funds and 13f institutions suggests that investors with long-term horizons tend to prefer better ESG stocks.

At the same time, however, there are other factors we need to account for in examining the relation between portfolio churn ratios and fund-level ESG scores. For example, funds with different churn ratios often follow different investment styles, which may correlate with portfolio companies' ESG score. Thus, we control for other fund characteristics through the following methods. For each fund-quarter, we calculate the value-weighted stock characteristics of a mutual fund's portfolio companies. These characteristics may reveal the investment style of a fund (e.g., large-capitalization funds versus small-capitalization funds, value funds versus growth funds). Furthermore, we include a set of dummy variables for each Lipper Objective Code assigned to a fund. These two approaches allow us to compare turnover differences only among

funds that share a similar investment strategy. In addition, we control for a fund's total assets under management (TNA).

Specifically, we run the following regression that also includes time fixed-effects and Lipper Objective fixed-effects:

$$FundESG_{i,t} = \alpha_t + \beta_1 Horizon_{i,t} + \beta_2 Characteristics_{i,t-1} + \epsilon_{i,t}. \quad (1)$$

$FundESG_{i,t}$ is the weighted-average ESG score for Fund i' s portfolio companies at time t. As described earlier, we use two measures of a fund's investment horizon. of a fund is measured in two ways. The portfolio churn ratio (CR) is calculated as in Gaspar et al. (2005), which is measured quarterly, using a four-quarter moving-average to attenuate measurement errors. We also use the fund's annual reported portfolio turnover ratio. The standard errors are two-way clustered at fund and quarter level.

Table 2 shows the regression results. In Column (1), the churn ratio of a fund is negatively related to the fund's ESG score. A one standard deviation increase in fund churn ratio (0.28) corresponds to a 0.10 point decrease in the ESG score of fund's portfolio holdings. Since the average fund-level ESG score is 0.66 in the sample, the impact of fund churn ratio is both economically meaningful and statistically significant at 1% level. The relation between investor horizon and the weighted-average ESG score of portfolio holdings, as seen in Figure 1, appears robust to controlling for fund investment style.

Column (2) of Table 2 uses the fund's reported turnover ratio as an alternative measure for investor horizon. The negative relation is still statistically significant at 1% level. A one standard deviation increase in the turnover ratio (0.52) corresponds to a 0.10 point decrease in the fund-level ESG score. Longer-horizon mutual funds, which have lower turnover ratios, seem to prefer more high-ESG stocks.

Since both fund-level ESG scores and the investment horizons of mutual funds are

slow-moving variables, one might worry that the relationship we document is driven by unobservable fund-specific characteristics. To address this, in Columns (3) and (4) of Table 2, we include fund fixed-effects to absorb fund heterogeneity. The results show that the negative relation between fund churn ratio (fund turnover ratio) and fund ESG score is robust to fund fixed-effects. In other words, for the same fund, it tends to hold higher-ESG stocks during periods of longer investment horizon.

One alternative explanation for the observed relation between fund turnover ratio and fund ESG score is that it is driven by a subset of mutual funds that have constraints on investing in high-ESG stocks. Since the investment universe for these ESG-only funds is more constrained, they may trade less frequently as a result. To test the validity of this alternative explanation, we include an SRI indicator variable in the regression, and interact the SRI indicator with our investment horizon measure. The goal is to examine whether investment horizon has an independent relation with the fund-level ESG score.

Columns (5) and (6) of Table 2 show that the relation between investor horizon and portfolio company ESG scores is not driven by the SRI funds in the sample. In both columns the coefficients on fund churn ratio and fund turnover ratios are negative and significant, and after separating out SRI funds, the magnitudes show little qualitative change from Columns (1) and (2). For SRI funds, the negative relation between investors' horizon and fund ESG score appears more pronounced. Unsurprisingly, the coefficient on the SRI fund dummy is positive, indicating that SRI funds on average hold stocks with higher ESG scores.

In Column (7) of Table 2, we examine the relation between investment horizons and ESG profile of holdings for 13f institutions, instead of mutual funds. To proxy for the horizons of 13f institutions, we use their portfolio churn ratios. Similar to what we have found with mutual funds, institutions with longer horizons (i.e., lower churn ratios) tend to hold stocks with higher ESG scores. The coefficient on churn ratio is

negative and significant. Overall, the evidence in Table 2 for both mutual funds and 13f institutions indicates that investors with longer investment horizons have greater preferences for high-ESG firms more than do investors with shorter horizons.

3.2 Institutional investors' revealed preference for higher corporate ESG profiles: Firm-level evidence

Since long-term investors seem to prefer stocks with higher ESG profiles, a corollary hypothesis is that firms with better ESG profiles would have shareholder bases with longer investment horizons. That is, we should find that firms with higher ESG scores attract longer term institutional investors. To test this hypothesis, we conduct empirical analyses at the firm-year level: for each stock in our sample, we examine the relationship between the firm's ESG score and the value-weighted average investment horizon of its (mutual fund or 13f institution) shareholders in aggregate through the following regression analysis:

$$InvestorHorizon_{i,t+1} = \beta_t + \beta_1 ESG_{i,t} + \gamma Controls_{i,t} + \epsilon_{i,t}. \quad (2)$$

Our hypothesis predicts a positive β_1, which would indicate that a firm's higher ESG score predicts a shareholder base of institutional investors that, on average, have longer investment horizons. The results, reported in Table 3, show this to be the case. In Column (1), the investment horizon of a firm's mutual fund shareholders is proxied by the weighted-average turnover ratio of these funds and we find a significant negative relation between this turnover ratio and a firm's ESG score. Thus, firms with better ESG profiles tend to have an investor base with *longer* investment horizons. A one standard deviation increase in a firm's ESG score (2.42) is associated with a decrease in the firm-level mutual fund turnover ratio of 0.47 percentage point. Similarly, in

Column (2), high ESG firms on average have mutual fund shareholders with lower *Churn* ratios (longer horizons). The relation between mutual fund shareholders' investment horizons and firms' ESG scores are statistically significant at 1%. A one standard deviation increase in a firm's ESG score is associated with a decrease in the firm-level mutual fund churn ratio of 0.29 percentage point. In both Columns (1) and (2), we additionally control for the flow volatility of the firm's mutual fund shareholders. The inclusion of flow volatility helps establish that the relation between corporate ESG and investor horizon is driven by the managers' trading decisions rather than investment decisions of the end investors, which would be reflected in fund flows.

In Column (3) of Table 3, we regress the weighted-average *Churn* ratio of a firm's 13f institution shareholders on corporate ESG scores. Consistent with our findings for mutual fund investments, the coefficient indicates a significantly negative relation between a firm's ESG score and 13f investor horizons. An interquartile change in ESG score (3) is associated with a 0.48 percentage points decrease in its weighted-average institution churn ratio, which represents 7.5% of the standard deviation. The findings support the hypothesis that firms with better ESG reputations attract more long-term oriented investors.

We further examine the relation between investors' horizon and corporate ESG profiles by using the Bushee (1998) classification, which is based on portfolio diversification along with portfolio turnover. Both dedicated investors and quasi indexers have relatively lower portfolio turnovers and transient investors are characterized as short-term investors. Hence, we employ the ratio between transient investors and all 13f institutions ($TRA/13fOwn$) as the dependent variable. Our hypothesis predicts a negative relation between a firm's ESG score and the ratio of transient investors in the firm's shareholder base. Consistent with our hypothesis, Column (4) of Table 3 shows such a negative relation exists between a firm's ESG score and the relative

ownership of transient investors. Firms with better ESG profiles seem to have more dedicated investors and quasi-indexers rather than transient investors.

In order to better understand this firm-level result we consider disaggregated measures of a firm's ESG profile. First, we split the ESG measure into two measures, the firm's ESG strength score and its ESG concern score. (Interestingly, these two measures are positively correlated (31%) perhaps because many of the strengths and concerns offset each other with good ESG performance in some indicators being adopted to compensate for poor performance in others. Columns (1) to (2) of Table 4 show the relation between mutual fund shareholder horizons and firms' ESG strengths and concerns. For both mutual fund turnover and churn ratio, the negative relation between ESG profiles and investor horizons is exclusively driven by ESG strengths as opposed to ESG weaknesses. In contrast, Column (3) shows that for 13f institutional churn ratios, there is no differential impact between the strengths and concerns. They both have significant negative coefficients.

One potential criticism is that our results could be driven by governance, the G in ESG, and that we are just showing that certain institutions select better governed firms. To address this criticism, we remove all governance indicators. We also remove business function related indicators which can result in firm exclusions (e.g., whether a firm operates in sin industries). Columns (4) to (6) of Table 4 show that our results remain both statistically and economically significant for an "ES" as opposed to an ESG measure. This indicates that institutional investors with long horizons indeed care about aspects of corporate ESG such as environmental and social responsibility.

In summary, we find empirical evidence that firms with higher ESG scores attract mutual funds and 13f institutions with longer-term focuses, as well as non-transient institutional investors. These findings suggest that there is a clear heterogeneity in investors' preference for corporate ESG, and the heterogeneity depends critically on investors' horizons.

3.3 Identification from FTSE4Good US Index rebalances

So far, we find a strong and robust association between a firm's ESG profile and the investment horizon of the firm's institutional investors. This finding, we argue, suggests that long-term investors are more attracted by corporate ESG. The endogeneity concern is that there may be unobserved firm characteristics that both attract long-term investors and correlate with a firm's ESG performance. To better tease out the causality between corporate ESG and investor horizon, we need to find shocks that only change the (perceived) ESG standing of companies.

To this end, we use a shock that derives from the bi-annual FTSE4Good index rebalances. Launched in 2001, the FTSE4Good Index Series is described as *"a series of benchmark and tradable indices for ESG (Environmental, Social and Governance) investors.*[10] FTSE-Russell develops proprietary criteria regarding the ESG performance of companies using over 300 indicators. Firms are assigned ESG ratings between 0 (worst) to 5 (best) based on those criteria. Firms with an ESG rating 3.1 or above are included in the FTSE4Good Index, pending other requirements.[11] The index series is one of the more prominent ESG investing benchmarks, and the index constituents are evaluated and rebalanced semi-annually. We test whether investors react to the shock to firms' public ESG profiles by examining how they change their portfolio holdings following a stock's inclusion to or exclusion from the Index, and whether the responses vary across investors with different horizons.

To be clear, inclusions to and exclusions from the FTSE4Good Index may or may not represent shocks to a firm's *actual* ESG profile. If new revelations of a firm's ESG conduct promptly leads to changes in the firm's membership in FTSE4Good Index,

[10] FTSE4Good Index Series Factsheet. Available at http://www.ftse.com/Analytics/FactSheets/temp/cfba7c47-6297-4c61-aa33-c550a79d0e93.pdf

[11] For a more complete description of FTSE4Good's methodology, please visit http://www.ftse.com/products/indices/FTSE4Good. Note that a stock can be added into or removed from the FTSE4Good Index after it is added into or removed from the broader, underlying FTSE USA index for non-ESG-related reasons. Such constituent additions and removals are excluded from our analyses.

then rebalances represent shocks to actual ESG. Alternatively, the rebalances may represent shocks to a firm's *perceived* ESG profile, to the extent that institutional investors may give more credence to a firm's ESG profile when it is certified by a third party such as FTSE-Russell. If FTSE4Good Index rebalances only shock the perceived ESG profile of involved companies, the investor responses that we estimate in our tests may be a lower bound for the impact of actual ESG shocks.

Using the FTSE4Good US Index rebalance events as shocks to corporate ESG profiles, we test our hypotheses regarding investor horizons and ESG preferences and examine how long-term investors adjust their portfolios in comparison to other investors. If long-term investors indeed have a stronger preference for corporate ESG, as our earlier results suggest, we expect them to respond more strongly to the Index rebalances than other investors.

We extract the holdings of mutual funds and 13f institutions for firms that are included into or excluded from the Index. For both mutual funds and 13f institutions, we define long-term investors as investors whose trailing four-quarter portfolio churn ratios fall below 30 percentile at the end of Quarter t-2 relative to the rebalance events (the rebalances take place between the end of Quarter t-1 and the end of Quarter t). We then examine the portfolio ownership of long-term investors and other investors during the event Quarters t-2, t-1, t, and t+1. The first two quarters are the "before" quarters and the latter two quarters are the "after" quarters.

We then conduct difference-in-differences analyses both at investor-level and at stock-level. For investor-level analysis, the following specification is examined for investor i of stock j:

$$\frac{Holdings_{i,j,t}}{SharesOut_j} = \alpha + \beta_1 LongTerm_{i,t} * After_t + \beta_2 LongTerm_{i,t} + \beta_3 After_t + \epsilon \quad (3)$$

To absorb heterogeneity at investor level (e.g. differences in portfolio size), investor-

by-event fixed effects are included and the dummy variable for investor type ($LongTerm$) is subsumed.

To assess the economic impact of long-term investors' ESG preference, we further aggregate the portfolio holdings across investors of the same type (long-term and other investors). To this end, we collapse the observations such that for each stock at each event quarter, only the aggregate ownership of long-term investors and the aggregate ownership of other investors are kept. The following equation is then estimated:

$$\frac{\sum_{i \in I_j} Holdings_{i,j,t}}{SharesOut_j} = \alpha + \beta_1 LongTerm_{i,t} * After_t + \beta_2 LongTerm_{i,t} + \beta_3 After_t + \epsilon \quad (4)$$

In both of the previous two models, standard errors are clustered at event level. The coefficient of interest is β_1, which under our hypothesis should be positive for inclusion stocks and negative for exclusion events. The identifying assumption is that, other than firms' ESG reputation, FTSE4Good Index inclusion and exclusion decisions do not correlate with firm covariates on which long-term investors and other investors have different preference.

We run regressions separately for index inclusions and exclusions. The results for inclusion events are shown in Panel A of Table 5. At investor-level, Columns (1) and (2) show that after an inclusion, an average long-term mutual fund increases its ownership in stock j by 0.00211 percentage point after index inclusions, relative to other mutual fund; An average long-term 13f institution increases its ownership by 0.00239 percentage point after index inclusions, relative to other 13f institutions. Both increases are statistically significant at 10% level.

The increased ownership of individual long-term investors also change the aggregate ownership structure of the event stocks. In Columns (3) and (4) of Table 5, we find that at stock-level, the aggregate long-term mutual fund ownership increases by 0.233 percentage point as compared to the ownership by other mutual funds, while

the long-term institutional ownership increases by 1.332 percentage points. These results are consistent with our prediction that shocks that increase a stock's ESG reputation make it more attractive to investors with long-term horizons.

Panel B of Table 5 examines the events where stocks are excluded from the FTSE4Good Index because of deterioration of ESG profiles. Parallel to our findings for index inclusions, long-term investors decrease their holdings in exclusion stocks relative to other investors. This is particularly true for mutual fund investors, both at investor-level and at stock level (Columns (1) and (3)). For example, on aggregate, long-term mutual funds shed 0.358 percentage point of ownership after an exclusion event, relative to other investors. On the other hand, long-term 13f institutions have a more mild response to index exclusions, as their change in ownership is negative but not statistically significant (Columns (2) and (4)).

Our identification assumption for using FTSE4Good Index rebalances as a laboratory is that, other than firms' ESG reputation, the index inclusion and exclusion decisions do not correlate with firm covariates on which long-term investors and other investors have different preference. While there is no obvious alternative characteristics other than ESG which FTSE-Russell takes into account in making rebalance decisions, we conduct a triple-difference test with a matched control sample to further tighten our identification strategy. The idea is to construct a sample of control stocks that have similar observables as the inclusion (exclusion) stocks. If the long-term investor ownership does not change around rebalances for these control stocks, we are assured that the changes in long-term ownership for inclusion or exclusion stocks are induced by shocks to a firm's ESG profile.

The control sample is constructed as follows. For each inclusion stock, we first match it with stocks that are not in the FTSE4Good Index before the rebalance event. For an exclusion stock, we match it with stocks that are already in the FTSE4Good Index. Candidate matched stocks must have the same two-digit SIC industry code as

the inclusion or exclusion stock (called the "treated" stock). We then sort the candidate stocks on the differences between their market capitalization and the treated stock's market capitalization. This generates a "market cap rank", where the candidate stock with $rank = 1$ has the closest market capitalization with the treated stock. We conduct the same ranking practice with respect to the past 12-month stock returns prior to the rebalance for candidate matches, and generate a "return rank". The stock with smallest sum of market cap rank and return rank for each treated stock enters into the control sample.

Panel A of Table 6 displays the characteristics of the treated stocks and control stocks. Due to the availability of perfect matches, only 148 inclusions and 112 exclusions are admitted to this analysis (down from 153 and 115 events). The market capitalization and past 12-month returns are statistically indistinguishable between the treated group and the control group.

In Panel B of Table 6, we conduct a tripe-difference test to delineate the changes of FTSE4Good rebalances on long-term investor ownership between treated stocks and control stocks.

$$\frac{\sum_{i \in I_j} Holdings_{i,j,t}}{SharesOut_j} = \alpha + \beta LongTerm_{i,t} * After_t * Treated_j + OtherInteractions \quad (5)$$

The prediction is that β should be positive for index inclusions and negative for index exclusions.

Columns (1) and (2) of Table 6, Panel B show that, after an inclusion event, the ownership of long-term investors increases significantly relative to the ownership of other investors, even after taking into account how their ownership changes for control stocks with similar characteristics. For example, in Column (1), long-term mutual fund investors increase their ownership by 2.04 percentage points and β is significant at 1% level. Similarly, after a stock is excluded from the FTSE4Good

Index, the aggregate ownership of long-term investors drops, using the ownership of control stocks as a benchmark. Given the similarity between treated stocks and control stocks, we are confident that the responses by long-term investors in changing their portfolio holdings is attributed to long-term investors' consideration for firms' ESG profiles.

Taken together, the analysis in this subsection shows that long-term investors respond differently following shocks to a firm's ESG profiles. In general, long-term investors tend to increase their holdings after a firm's ESG profile improves and decrease their holdings after a firm's ESG profile deteriorates, as compared to other investors. The discrete changes in corporate ESG profiles as captured by FTSE4Good Index rebalances allow us to obtain sharper results about whether investors' investment horizons affect their preferences for corporate ESG.

4 Corporate ESG and mutual fund trading strategies

In the previous section we have found that high ESG firms tend to attract more long-term oriented investors. In this section, we further examine whether mutual fund managers' trading strategies vary with respect to high versus low ESG firms' stocks. In particular, we are interested in whether the managers decide to sell existing holdings of a firm's stock following periods of poor stock performance or an earnings shortfall, and whether the sensitivity of such selling decisions is lower for firms with high ESG profiles. In other words, for a *given* mutual fund, do its managers act more patiently towards high ESG firms relative to low ESG firms?

4.1 Do investors trade high ESG firms more patiently?

Past studies have shown that mutual funds on average are momentum traders: they sell stocks after periods of poor performance or negative earnings surprises (Grinblatt, Titman, and Wermers (1995)). This type of trading behavior sparks concern that institutional ownership induces myopic corporate decisions. However, as we argued in this paper, firms with better ESG performance create long-term value for shareholders and hence attract investors with longer horizons. By the same token, if mutual fund managers understand that high ESG firms tend to have better structures to implement strategies that yield long-term benefits, then their investment decisions should depend less on recent stock performance.

To answer this question, we examine mutual funds' decisions to sell firm j's stock, whether the sensitivity of selling with respect to firm performance varies with corporate ESG profile. Our hypothesis suggests that investors would be more patient with high ESG firms delivering negative results. Thus, we test whether the relation between past stock returns and fund managers' trading decisions becomes more muted if a company has a high ESG profile.

The first set of regressions we run associate the funds' selling decisions with the firms' past 12-month excess returns. The observation is at the fund-stock-quarter level and the standard errors are clustered by stock. The dependent variable is a dummy indicating that fund i decreases its holding in firm j between period $t-1$ and t. Since the emphasis of this section focuses on the different levels of "patience" toward different companies held by the *same* fund, all specifications include fund-quarter fixed-effects.

$$\begin{aligned} Dummy(Sell)_{i,j,t} = \alpha_{i,t} + \beta_1 ExcessReturn^{-}_{j,t} + \\ \beta_2 ESG_{j,t} * ExcessReturn^{-}_{j,t} + \gamma X_{j,t} + \epsilon_{i,j,t} \end{aligned} \tag{6}$$

where $ESG_{j,t}$ is the MSCI ESG score of stock j. Since we are interested in mutual

funds' selling decisions following poor stock performance, $ExcessReturn^{-}$ indicates the negative component of a stock's excess return: $\min(ExcessReturn, 0)$. The intercept, $\alpha_{i,t}$, indicates fund-by-time fixed effects.

The coefficient of interest in this regression is β_2, which captures the differential effect of past return on selling decisions between high and low ESG firms. According to our hypothesis β_2 should have the opposite sign to β_1, which would indicate that a high ESG profile reduces the trend-chasing tendency of mutual fund managers. Results from Table 7 support this claim. The results reported in Column (1) show a strong inverse relation between past stock returns and the probability of selling a position: a 10 percentage point decrease in past stock excess returns raises the probability of a position being sold by 1.24 percentage points.

More importantly, the coefficient on the interaction between ESG score and past stock return is negative and significantly different from zero. The result suggests that, given a poor past stock performance, a firm with a higher ESG score is less likely to be sold by mutual fund managers as compared to a firm with a lower ESG score. If a firm's ESG score increases by one standard deviation (2.42), the sensitivity between past poor returns and mutual-fund selling decision is attenuated by 38 basis points (0.00156*2.42). This result suggests that fund managers are more patient towards firms with well-established ESG profiles. The finding further strengthens when controlling for unobserved firm characteristics using stock fixed effects (Column (2)).

In Columns (3) and (4) of Table 7, the dependent variable is (the negative of) changes in fund i's fractional trade of stock j in quarter t ($\frac{-\Delta Holdingsi,j,t}{Holdings_{i,j,t-1}}$). This variable captures a fund's selling through a more continuous methodology. A similar pattern is found to the previous dichotomous method: mutual funds' selling trades are positively related to the past return of the stocks ($\beta_1 < 0$). For example, a 10 percentage points decrease in excess stock returns is associated with a 4 percentage

points decrease in the fund's holdings of a particular stock. However, when a firm has a high ESG score, this relation is weakened ($\beta_2 > 0$). The interaction effect is statistically significant. Again, mutual fund managers seem to trade with more patience if a company has a better track record with respect to ESG issues.

Another widely-followed measure of a company's short-term performance is the earnings outcome as compared to expectation. Evidence suggests that U.S. public company management feels pressure to meet or beat their earnings expectations (Graham, Harvey, and Rajgopal (2005)). Such emphases on meeting short-term goals allegedly cause management to expend energy and time managing earnings, thus, distracting them from investing in projects that add value. Having a good ESG profile, however, may convince investors that the firm has a plan to create shareholder value in the long-run. Fund managers are therefore more likely to tolerate earnings shortfalls and stick with their investments.

We measure earnings surprises in two ways: we first use seasonal-adjusted earnings growth from the Compustat earnings per share item, scaled by current stock prices ($\frac{X_{j,t}-X_{j,t-4}}{P_{j,t}}$, where $X_{j,t}$ is the Compustat-based earnings per share before extraordinary items). Livnat and Mendenhall (2006) find that EPS follows a seasonal random walk, so the seasonal-adjusted earnings growth is the best proxy for the "surprise" component. For the second version of earnings surprise we calculate the difference between actual earnings and the median analyst forecast scaled by share prices.

We run a set of regressions with fund-quarter fixed-effects (to isolate the selling decisions for a *given* mutual fund) as follows:

$$\begin{aligned} Dummy(Sell)_{i,j,t} = \alpha_{i,t} + \beta_1 EarningsShortfall_{j,t} + \\ \beta_2 ESG_{j,t} * EarningsShortfall_{j,t} + \gamma X_{i,t} + \epsilon_{i,j,t} \end{aligned} \tag{7}$$

where $EarningsShortfall$ is based on the shortfall of announced earnings and is measured by (1) a dummy variable that indicates a negative earnings surprise, that is,

$Dummy(EarningsSurprise < 0)$; or (2) the actual magnitude of a negative earnings surprise, i.e. $Max(-EarningsSurprise, 0)$.

We calculate earnings surprise using two methods as described earlier. The first version uses the seasonal-adjusted earnings growth ($\frac{X_{j,t}-X_{j,t-4}}{P_{j,t}}$), where $X_{j,t}$ is the earnings per share before extraordinary items for firm j at time t. The second version of earnings surprise uses the difference between actual earnings and the median analyst forecast, similarly scaled by share prices.

The hypothesis is that fund managers are more likely to sell their holdings following earnings shortfalls ($\beta_1 > 0$). If a firm has a high ESG profile, however, the relation between earnings shortfall and funds' selling is weakened ($\beta_2 < 0$). This is exactly what the results in Table 8 indicate. Column (1) of Table 8 shows, conditional on a negative earnings surprise, a given mutual fund is more likely to sell its position in the company by 1.08 percentage points. When a company has a higher ESG score, however, mutual fund managers are significantly less likely to sell following an earnings shortfall. In fact, if a company increases its ESG score by two standard deviations, the sensitivity between earnings shortfall and mutual-fund selling will decrease by one-fifth. When the earnings shortfall is measured by the actual magnitude of the earnings surprise, the ESG score similarly has a mitigating effect on the sensitivity of trading on earnings. If we change the dependent variable to the fractional trading of mutual fund positions (as shown in Columns (3) and (4)), the results are again consistent in showing that mutual fund managers appear to be more patient in holding their positions in a high ESG firm following adverse earnings announcements.

Columns (5)-(8) of Table 8 repeat the analyses using deviations from the median analyst forecast as proxies for earnings surprises. The results are qualitatively and quantitatively similar to the other results: mutual funds tend to sell stocks following negative earnings surprises; having a high ESG score mitigates the relation between earnings shortfalls and selling. Fund managers seem to base their trading decisions

less on recent negative earnings announcements if the firm has a strong ESG score. To corporate executives concerned about pressure from their investors' myopia, the dampening effect of the corporate ESG profile on the earnings sensitivity of trading may present improving ESG profile as an appealing approach in maintaining their investor relationships.

To summarize, the findings in this section complement what we document in the previous section: not only do high ESG firms attract the type of institutional investors that are long-term focused, investors also act more patiently towards high ESG firms relative to other firms in their portfolios. In particular, mutual funds are less likely to sell a firm following poor stock performance or earnings shortfall if the firm has a high ESG profile. To the extent that institutional investors' emphasis on firms meeting or beating earnings expectations drives the alleged corporate "myopia", better ESG profiles may free corporate managers to undertake long-term projects.

4.2 Investors' patience before and after FTSE4Good US Index rebalances

In addition to the institutional holdings around the rebalance events, investors' behavior may also change following the inclusions or exclusions in ways that are consistent with the previous hypotheses. In particular, we hypothesize that institutional investors become more or less patient after a stock is included into or excluded from the FTSE4Good Index. Since we can compare the same stock in a relatively short time window (four quarters before and after) around the rebalance events, this setting gives us better identification for attributing the changes of investors' trading patterns to the shock of changes in (perceived) corporate ESG profiles.

Specifically, we estimate the sensitivities of mutual funds' selling decisions with respect to companies' negative earnings surprises. Our interest is in testing whether investor selling sensitivities change when a stock is included into or excluded from

the Index. To test this hypothesis, we adopt the following empirical framework

$$Dummy(Sell)_{i,j,t} = \alpha_j + \beta_1 EarningsShort_{j,t} + \\ \beta_2 Post_{j,t} * EarningsShortl_{j,t} + \beta_3 Post_{j,t} + \epsilon_{i,j,t} \tag{8}$$

where *EarningsShort* is a dummy indicating firm j's earnings surprise is negative during quarter t. The specification includes event-stock fixed effects. This ensures that we compare the same stock before and after its inclusion or exclusion event.

Since both inclusion and exclusion events are in the sample, the dummy variable *Post* is defined in the following way: For stocks that are included in the FTSE4Good US Index, quarters $t-4$ to $t-1$ are defined as "pre" period, and quarters $t+1$ to $t+4$ are defined as "post" period.[12] For stocks that are excluded from the Index, quarters $t+4$ to $t+1$ are defined as "pre" period, while quarters $t-1$ to $t-4$ are defined as "post" period. By defining pre- and post-periods in this way, there is a clear prediction on the sign of the coefficient β_2 from the above equation. Since "post" is associated with a period where the firm's ESG reputation is relatively higher, one would expect mutual funds' selling to be less sensitive to earnings shortfalls during the "post" period. Hence, β_2 is predicted to be negative. Note that we exclude quarter t, the quarter of rebalance events, to avoid trading activities directly associated with index inclusion and exclusion.

Table 9 displays the results. In Columns (1) and (2), earnings surprises are measured by the firms' seasonal-adjusted earnings growth rates. If the dependent variable (Column (2)) is the fraction trading from the last quarter, a negative earnings surprise is associated with an average selling of 3.15 percentage points of last-quarter holdings. After rebalance events, however, this sensitivity is decreased by 0.75 percentage points. This difference is marginally significant at the 10% level.

[12] We intentionally exclude quarter t from the analysis, since we have shown that active trading takes place immediately following the announcement of rebalance. This trading is less likely to be caused by earnings surprises.

In Columns (3) and (4) of Table 9 we measure earnings surprises using the difference between actual announcement earnings and the median analyst forecast. Here, a negative earnings surprise increases mutual funds' propensity to sell by 3.24 percentage points. After the rebalance events, however, the selling propensity drops by 1.01 percentage points. Similarly, an ESG-enhancing rebalance event decreases the average fraction selling following negative earnings surprises from 4.2 percentage points to 2.75 percentage points ($0.042 - 0.0145$). The differential in trading sensitivity is statistically distinct from zero.

These findings suggest a well-identified relation between companies' ESG profiles and mutual fund managers' propensity to sell following an earnings shortfall. Mutual fund managers are more (less) patient towards firms whose ESG profiles improve (deteriorate).

5 Overall investor preferences for corporate ESG during our sample period

Thus far, we have shown for our sample, on average, long-term investors tend to prefer high-ESG stocks as compared to the preferences of short-term investors. We next consider aggregate mutual fund and 13f ownership in firms according to ESG profiles and whether these relationships change over time. In general investors have increasingly focused on ESG as an investment criteria in recent years. For example, since its founding in 2006, the UN-backed Principles for Responsible Investment (PRI) has grown from 100 signatories to more than 1,900 and $81.7 trillion in assets under management.[13]

[13]https://www.unpri.org/about The PRI "works to understand the investment implications of environmental, social and governance (ESG) factors and to supports its international network of investor signatories in incorporating these factors into their investment and ownership decisions. The PRI acts in the long-term interests of its signatories, of the financial markets and economies in which they operate and ultimately of the environment and society as a whole."

As a preliminary analysis of aggregate relationships, we first sort the sample firms into quartile groups at the end of 2003 by their total net MSCI ESG score.[14] We then track the mutual fund or 13f institutional ownership level for the highest and the lowest ESG score cohorts over time. To account for the heterogeneity in firm characteristics, we further adjust the percentage (mutual fund or 13f institution) ownership of a firm by the average percentage ownership in the 125 DGTW benchmark portfolios.[15]

The upper panel of Figure 2 shows the DGTW-adjusted mutual fund ownership of the top ESG-quartile firms and the bottom ESG-quartile firms. Over time as implied by the increasing public focus on ESG activities as investment criteria, we find an increasing mutual fund preference for the higher ESG-profile firms and a decreasing preference for the lower ESG-profile firms. At the beginning of the sample period the DGTW-adjusted mutual fund ownership is considerably lower for high ESG firms than for low ESG firms, but the relative preference completely reverses later in the period. This result appears to reflect the changing investment landscape during the past ten to fifteen years in which ESG investing has attracted increasing mainstream attention and has become more widely accepted and practiced. (For example, Bialkowski and Starks (2018) show increasing media attention to ESG issues over time and increasing relative flows to SRI funds.) In the lower panel of Figure 2, we plot the average DGTW-adjusted 13f institutional ownership for the top and bottom ESG-quartile portfolios. The general pattern is similar: high ESG firms have a lower 13f institutional ownership at the beginning of our sample; the gap in institutional ownership gradually diminishes as time goes by.

[14] We choose the beginning year to be 2003 because that was the first year that the MSCI ESG coverage was expanded to all MSCI USA IMI Index firms. Prior to that time, the analysis was limited to the 1,000 largest US companies.

[15] In each quarter, we sort eligible stocks into 5 by 5 by 5 groups sorted by market capitalization, book-to-market ratio, and past 12-month return momentum. We calculate the average percentage ownership within each bucket, and then subtract the bucket-mean from the corresponding percentage ownership of a firm.

To more systematically test whether investors' preferences for ESG have significantly changed over time, we conduct firm-level panel regressions, controlling for other firm characteristics that may affect ownership:

$$InvestorOwnership_{i,t+1} = \beta_t + \beta_1 ESG_{i,t} + \gamma Controls_{i,t} + \epsilon_{i,t} \tag{9}$$

The results are tabulated in Table 10. The findings suggest that ESG preferences among institutional investors are a relatively new phenomenon. Considering the average relationships over the entire sample period, the results show that firms with higher ESG scores have lower levels of mutual fund and 13f institutional ownership (Columns (1) and (5)). The negative preference could be attributable to unobserved firm characteristics not captured by the control variables or it could be attributable to different interpretations by investors during the early years of our sample as to the benefits and costs of corporate social responsibility.[16] This negative preference for ESG, however, has been changing rapidly over time. When we focus on investor holdings before and after 2010 (Columns (2) and (6)) the difference in actively managed mutual fund and 13f institutional investor preferences for low versus high ESG firms has all but disappeared. In Column (3), consistent with the post 2010 regression, we show that the year over year change in active mutual fund ownership of high ESG firms is positively associated with the firm's ESG score. This is also consistent with the graphical evidence we present in Figure 2, where the ownership gap between high- and low-ESG diminishes over time and, in the case of mutual fund ownership, reverses.

Finally, we show that for both actively managed mutual funds and 13f institutions, ownership breadth (defined as the number of institutions that hold any shares of a given firm over the total number of institutions that hold shares in the firm) is

[16] Ioannou and Serafeim (2015) argue that equity analysts viewed corporate social responsibility (CSR) as an agency cost in earlier years. Similar to our findings regarding the institutional ownership gap, the authors find that the analysts' pessimistic perception gradually reverses.

positively associated with a firm's ESG score (Columns (4) and (8)). We posit that this is likely driven by firms with particularly bad ESG performance being discounted by institutional investors in their investment decisions.

6 Conclusions

Investors have expressed growing interest over time in firms' actions with regard to ESG issues. This interest has been spurred at least in part by concerns about the long-term effects of firm actions and an emphasis to reject a focus on short-term profits at the expense of longer-term wealth. In this paper, we provide comprehensive empirical evidence regarding the revealed preferences of mutual funds and institutional investors for high ESG firms and how these preferences are related to the investors' horizons.

When corporate ESG policies are designed to improve shareholder value in the long-run, perhaps at the expense of current earnings, long-term oriented investors would be more likely to place higher value on the firms with better ESG profiles. In both fund-level analyses and firm-level analyses, we find a positive relation between investors' horizons and their preferences for high-ESG stocks. In the cross-section, firms with stronger ESG profiles attract shareholder bases that are on average more long-term. These long-term investors turn over their portfolio more slowly, which would conceivably allow them to capture any value created by corporate ESG policies. These results imply a match between the horizon of investors and the horizons of their portfolio firms.

We also find evidence that within a given mutual fund, managers' decisions to sell existing holdings following poor stock performance or earnings shortfall are influenced by the firm's ESG reputation. When a firm has a high ESG score and hence may be believed to produce long-term value for its shareholders, mutual funds tend to hold onto their positions in spite of short-term underperformance. This finding is par-

ticularly interesting in the context of suggestions that myopic institutional investors are too much concerned about whether their portfolio companies meet short-term earnings expectations.

By examining shocks to the perceptions of firms' ESG profiles, we provide evidence of causality in the relation between firms' ESG profiles and their institutional shareholders' preferences. The decrease of sensitivities of investors' selling decisions with respect to negative earnings surprises may allow managers to implement long-term strategic goals for the company that ultimately create value for their shareholders.

A further implication of our results is a potential increasing pressure on firms to consider and improve their ESG profiles. That is, companies who would like to attract investors with longer-term orientations could do so by improving their ESG performance. Since having a longer-term oriented shareholder base is often claimed to be desirable, companies may have strong incentives to do "good" to have the "right" investors.

Our results also have important implications for the future economy if one believes that the short-termism of some institutional investors holds back corporate innovations and investments and has social costs for financial markets and the economy as argued by a number of commentators (e.g., Keynes (1935); Lipton (1979); Kay (2012)).

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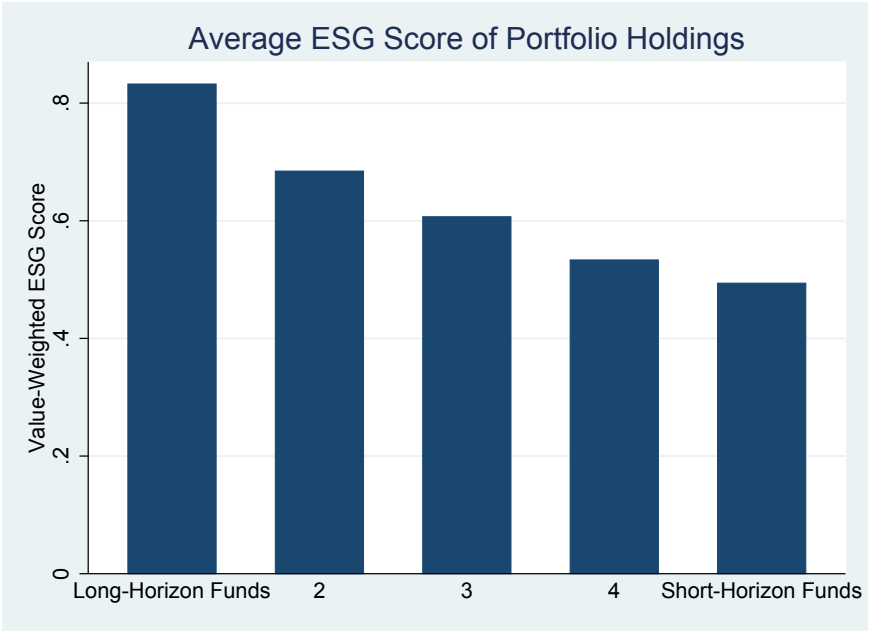
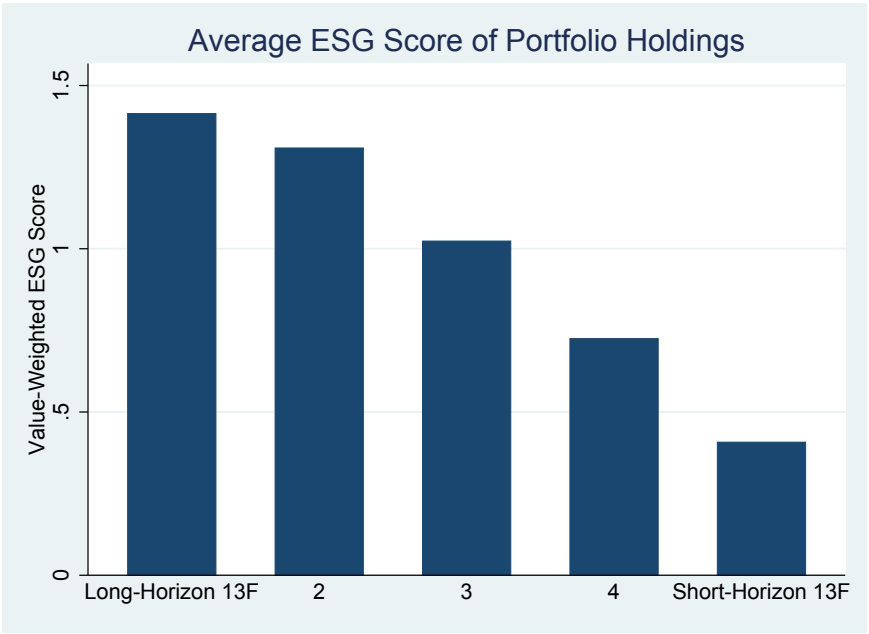
Figure 1. Portfolio Holdings' ESG Scores and Investor Investment Horizons



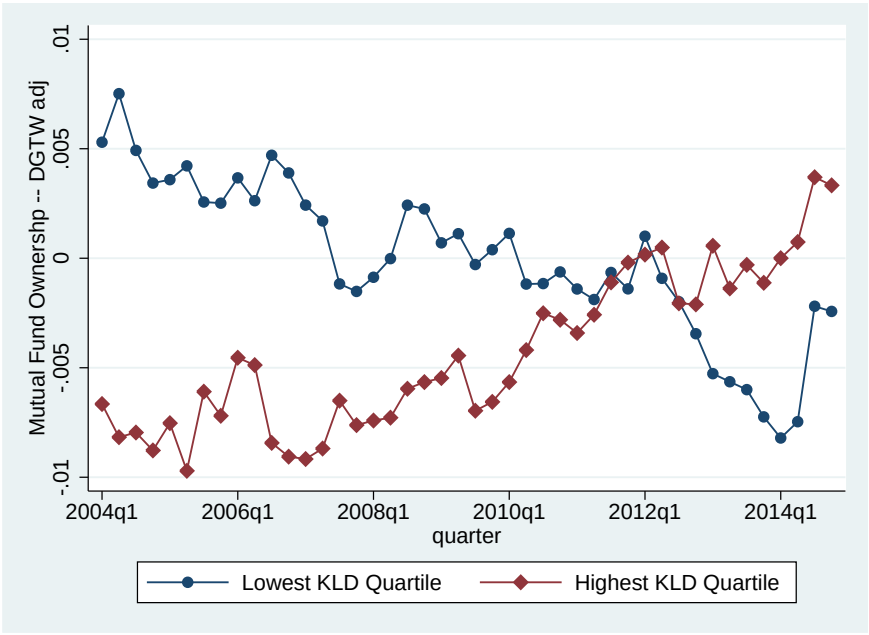
(a) Mutual funds



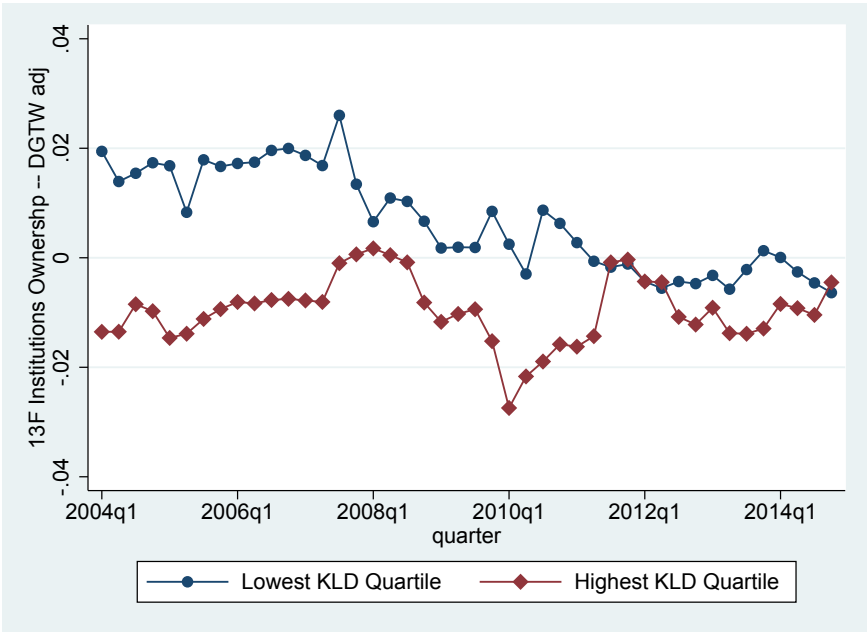
(b) 13F institutions

This figure shows the average ESG scores of investors' portfolio holdings with relation to investor horizons. Investor horizons are measured by portfolio churn ratios of mutual funds (13f institutions). Investors with the lowest portfolio churn ratios are defined as 'long-horizon". Panel (a) examines mutual funds and Panel (b) examines 13f institutions. Each mutual fund's (13f institution's) ESG score is calculated as the value-weighted average ESG score of its portfolio companies.

Figure 2. Aggregate Mutual Fund/Institutional Ownership for ESG-Sorted Stock Portfolios



(a) Mutual Fund Ownership - adjusted by DGTW benchmark group



(b) 13f Institution Ownership - adjusted by DGTW benchmark group

At the end of 2003, we sort stocks into quartile portfolios based on their MSCI ESG score, and track their future average mutual fund ownership (Panel (a)) and 13f institutional ownership (Panel (b)). The mutual fund/institutional ownership of a stock is adjusted by the average ownership within its DGTW benchmark group each year.

Table 1. Summary statistics

Panel A: Fund-level variables

N= 84,480	Mean	Stdev	P25	Median	P75
Turnover Ratio	0.76	0.52	0.34	0.62	1.06
Quarterly Churn Ratio	0.41	0.28	0.22	0.34	0.53
SRI Fund Indicator	0.02	0.15	0.00	0.00	0.00
Ln(Fund TNA)	5.61	1.89	4.29	5.60	6.94
Weighted-average of underlying stocks:					
ESG Score	0.66	1.72	-0.59	0.26	1.52
Ln(Market Cap)	9.78	1.63	8.36	10.52	11.17
Book-to-Market Ratio	0.50	0.19	0.36	0.47	0.60
12-Month Return	0.19	0.26	0.05	0.18	0.31

Panel B: Institution-level variables

N=129,905	Mean	Stdev	P25	Median	P75
Quarterly Churn Ratio	0.37	0.33	0.14	0.25	0.48
Ln(Total Holdings value)	19.76	1.79	18.50	19.46	20.85
Weighted-average of underlying stocks:					
ESG Score	1.00	1.75	-0.20	0.63	2.03
Ln(Market Cap)	10.61	1.15	10.08	11.01	11.44
Book-to-Market Ratio	0.50	0.24	0.37	0.46	0.58
12-Month Return	0.18	0.25	0.04	0.16	0.28

Panel C: Firm-level variables

N=21,870	Mean	Stdev	P25	Median	P75
ESG Score	-0.32	2.42	-2	0	1
MF Ownership(%)	14.87	8.48	8.42	14.43	20.69
13F Ownership(%)	67.98	20.03	55.58	71.76	83.57
Holding Mutual Fund Turnover (%)	52.2	19.4	39.9	52.8	68.2
Holding Mutual Fund Churn Ratio (%)	28.9	8.82	22.52	27.7	34.1
Holding 13F Institution Churn Ratio (%)	24.9	6.36	20.3	24.0	28.6
Transient/ Total Institution Ownership (%)	22.6	12.7	12.9	20.8	30.4
Market Cap ($mn)	5,962	15,453	442	1,231	3,907
Book-to-Market	0.63	0.48	0.32	0.52	0.80
12-Month Return	0.13	0.43	-0.13	0.10	0.32
Return Volatility	0.11	0.06	0.06	0.09	0.13
Turnover	0.20	0.29	0.07	0.12	0.21
Dividend Yield	0.01	0.02	0.00	0.00	0.02
Profitability	0.10	0.12	0.04	0.11	0.17
SP500 Dummy	0.25	0.43	0.00	0.00	0.00

Panel (A) shows the summary statistics for the full sample of fund-quarters used in the fund-level analyses. Panel (B) shows the summary statistics for 13f institutions. Panel (C) shows the summary statistics of firm-years used in the firm-level analyses. The sample period covers 2000-2014.

Table 2. Fund-level holdings ESG score and fund investment horizon

Dependent variable: Fund-level ESG Score							
Sample	Mutual Funds						13f Institutions
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Fund Churn Ratio	-0.350***		-0.208***		-0.325***		-0.279***
	(0.0715)		(0.0720)		(0.0707)		(0.0303)
Fund Turnover Ratio		-0.194***		-0.181***		-0.177***	
		(0.0442)		(0.0595)		(0.0438)	
Fund Churn Ratio * SRI Fund Indicator					-0.785*		
					(0.401)		
Fund Turnover Ratio * SRI Fund Indicator						-0.539**	
						(0.220)	
Ln(Fund TNA)	-0.00315	-0.00550	-0.00687	-0.0115	-0.000493	-0.00282	
	(0.00825)	(0.00810)	(0.0332)	(0.0318)	(0.00823)	(0.00806)	
Holdings Ln(Market Cap)	0.622***	0.626***	0.560***	0.559***	0.627***	0.630***	0.621***
	(0.0508)	(0.0510)	(0.0568)	(0.0568)	(0.0506)	(0.0508)	(0.0601)
Holdings Book-to-Market	0.199	0.202	1.159**	1.191**	0.217	0.219	-0.324**
	(0.326)	(0.325)	(0.527)	(0.520)	(0.325)	(0.324)	(0.131)
Holdings 12-Month Returns	0.813***	0.806***	0.795**	0.783**	0.815***	0.809***	-0.111
	(0.275)	(0.272)	(0.300)	(0.296)	(0.275)	(0.272)	(0.116)
SRI Fund Indicator					0.831***	0.885***	
					(0.217)	(0.210)	
Ln(Total Holdings Value)							-0.0234***
							(0.00625)
Observations	84480	84480	84408	84408	84480	84480	129905
Adjusted R^2	0.506	0.506	0.613	0.613	0.508	0.509	0.669
Quarter FE	Y	Y	Y	Y	Y	Y	Y
Investment Objective FE	Y	Y	Y	Y	Y	Y	N
Fund FE	N	N	Y	Y	N	N	N

This table reports the results from a fund-level regression of the average ESG scores for the fund's holdings on the fund's investment horizon: $FundESG_{i,t} = \alpha + \beta_1 Horizon_{i,t} + \beta_2 X_{i,t} + \epsilon_{i,t}$. $FundESG$ is the weighted-average ESG score of a fund's portfolio holdings. Mutual funds' investment horizons are proxied by either estimated fund churn ratios or reported fund turnover ratios. Fund churn ratios are estimated over the previous four quarters. $SRIFund$ is an indicator for whether a fund is classified as a Socially Responsible Investment fund. Observations are at fund-quarter level. All specifications include quarter fixed-effects. Standard errors are two-way clustered by fund and by quarter, and shown in parentheses. *, **, and *** and indicate 10%, 5%, and 1% significance respectively.

Table 3. Panel regression of shareholder investment horizons on ESG scores

Dependent variable(%)	MF Turnover	MF *Churn*	13f *Churn*	$TRA_{t+1}/13fOwn$
	(1)	(2)	(3)	(4)
ESG Score	-0.192**	-0.118***	-0.163***	-0.164***
	(0.0777)	(0.0296)	(0.0225)	(0.0349)
Log(Market Cap)	1.403***	0.164*	-0.427***	-0.703***
	(0.203)	(0.0882)	(0.0643)	(0.101)
Book-to-Market Ratio	-3.092***	-0.921***	-0.115	-0.725***
	(0.434)	(0.184)	(0.147)	(0.233)
Dividend Yield	-1.079***	-0.588***	-0.458***	-0.348***
	(0.0955)	(0.0416)	(0.0345)	(0.0515)
Profitability Ratio	-0.0309**	0.0106*	-0.00191	-0.00108
	(0.0151)	(0.00626)	(0.00527)	(0.00820)
Past 12-month Return	0.0938***	0.0347***	0.0150***	0.0237***
	(0.00289)	(0.00136)	(0.000946)	(0.00170)
Return Volatility	0.413***	0.232***	0.230***	0.240***
	(0.0331)	(0.0148)	(0.0107)	(0.0183)
Stock Turnover	4.734***	1.581***	2.281***	2.675***
	(0.605)	(0.249)	(0.252)	(0.350)
SP500 Dummy	-3.561***	-2.076***	-0.870***	-1.104***
	(0.696)	(0.275)	(0.196)	(0.316)
Underlying Fund Flow Volatility	4.633***	1.761***		
	(0.259)	(0.115)		
Observations	21870	21870	21870	21870
Adjusted R^2	0.310	0.303	0.378	0.485
Year Fixed-Effects	Y	Y	Y	Y

This table reports the results of regressions of shareholders' investment horizons on firms' MSCI ESG scores and control variables. The observations are at firm-year level. In Column (1), the dependent variable is the weighted-average turnover ratio of a firm's mutual fund shareholders. In Column (2), the dependent variable is the weighted-average *Churn* ratio of a firm's mutual fund shareholders. In Column (3), the dependent variable is the weighted-average *Churn* ratio of a firm's 13f institution shareholders. In Column (4), the dependent variable is the ratio between transient (TRA) institution ownership and total 13f institution ownership. The classification of 13f institutions follows Bushee (1998). Year fixed-effects are included across specifications. Standard errors are clustered at stock level, and shown in parentheses. *, **, and *** and indicate 10%, 5%, and 1% significance respectively.

Table 4. Panel regression of shareholder investment horizons on ESG scores: Robustness

Dependent variable(%)	MF Turnover	MF *Churn*	13f *Churn*	MF Turnover	MF *Churn*	13f *Churn*
	(1)	(2)	(3)	(4)	(5)	(6)
ESG Strength Score	-0.321***	-0.139***	-0.126***			
	(0.0848)	(0.0315)	(0.0237)			
ESG Concern Score	0.0333	-0.0625	-0.176***			
	(0.107)	(0.0424)	(0.0326)			
ESG x/Governance				-0.137*	-0.0931***	-0.123***
				(0.0803)	(0.0303)	(0.0226)
Log(Market Cap)	1.607***	0.208**	-0.456***	1.417***	0.175**	-0.409***
	(0.215)	(0.0939)	(0.0695)	(0.205)	(0.0890)	(0.0654)
Book-to-Market Ratio	-2.961***	-0.893***	-0.131	-3.061***	-0.904***	-0.0868
	(0.435)	(0.185)	(0.148)	(0.434)	(0.184)	(0.147)
Dividend Yield	-1.057***	-0.583***	-0.462***	-1.083***	-0.590***	-0.462***
	(0.0955)	(0.0418)	(0.0346)	(0.0957)	(0.0417)	(0.0346)
Profitability Ratio	-0.0314**	0.0105*	-0.00168	-0.0306**	0.0107*	-0.00161
	(0.0151)	(0.00626)	(0.00527)	(0.0151)	(0.00626)	(0.00528)
Past 12-month Return	0.0944***	0.0349***	0.0149***	0.0939***	0.0348***	0.0150***
	(0.00290)	(0.00136)	(0.000950)	(0.00289)	(0.00136)	(0.000948)
Return Volatility	0.419***	0.233***	0.230***	0.415***	0.233***	0.232***
	(0.0330)	(0.0148)	(0.0107)	(0.0331)	(0.0148)	(0.0108)
Stock Turnover	4.727***	1.580***	2.282***	4.744***	1.587***	2.287***
	(0.603)	(0.249)	(0.252)	(0.606)	(0.250)	(0.253)
SP500 Dummy	-3.157***	-1.993***	-0.938***	-3.585***	-2.081***	-0.882***
	(0.708)	(0.280)	(0.195)	(0.699)	(0.276)	(0.196)
Underlying Fund Flow Volatility	4.650***	1.764***		4.609***	1.747***	
	(0.258)	(0.114)		(0.258)	(0.114)	
Observations	21870	21870	21870	21870	21870	21870
Adjusted R^2	0.311	0.303	0.377	0.310	0.303	0.376
Year Fixed-Effects	Y	Y	Y	Y	Y	Y

This table reports the results of regressions of shareholders' investment horizons on several components of firms' MSCI ESG scores. The observations are at the firm-year level. In Columns (1) to (3), ESG score is decomposed into "strengths" and "concerns", where strength scores are positive and concern scores are negative. In Columns (4) to (6), strengths and concerns regarding corporate governance scores and industry (e.g. tobacco, nuclear) are excluded from the composite ESG scores. Year fixed-effects are included across specifications. Standard errors are clustered at stock level, and shown in parentheses. *, **, and *** and indicate 10%, 5%, and 1% significance respectively.

Table 5. Long-term investor ownership around FTSE4Good US Index rebalances

Panel A: Inclusion events

	Portfolio level		Stock level	
Dependent variable(%)	$Holdings_{i,j,t}/SharesOut_j$		$\sum_i Holdings_{i,j,t}/SharesOut_j$	
Investor type	Mutual funds	13f Institutions	Mutual funds	13f Institutions
	(1)	(2)	(3)	(4)
D(Long-term Investors)*After Index Rebalance	0.00211*	0.00239*	0.233**	1.332**
	(0.000785)	(0.000856)	(0.0663)	(0.603)
After Index Rebalance	-0.000429	-0.0000729	-0.165	-1.382***
	(0.000325)	(0.000748)	(0.144)	(0.487)
D(Long-term Investors)			3.089***	-9.370***
			(0.0510)	(1.530)
Observations	140079	238894	1202	1202
Adjusted R^2	0.962	0.924	0.069	0.114
Fund-by-event FE	Y	Y	N/A	N/A

Panel B: Exclusion events

	Portfolio level		Stock level	
Dependent variable(%)	$Holdings_{i,j,t}/SharesOut_j$		$\sum_i Holdings_{i,j,t}/SharesOut_j$	
Investor type	Mutual funds	13f Institutions	Mutual funds	13f Institutions
	(1)	(2)	(3)	(4)
D(Long-term Investors)*After Index Rebalance	-0.00118*	-0.00322	-0.358*	-0.0652
	(0.000394)	(0.00254)	(0.131)	(0.480)
After Index Rebalance	0.00133*	-0.00169	-0.219	-0.201
	(0.000455)	(0.00187)	(0.398)	(0.366)
D(Long-term Investors)			3.304***	-7.560***
			(0.123)	(1.847)
Observations	111938	186450	918	918
Adjusted R^2	0.957	0.920	0.086	0.077
Fund-by-event FE	Y	Y	N/A	N/A

This table reports the ownership of mutual funds and 13f institutions around the FTSE4Good US Index rebalance events. Investors (mutual funds or 13f institutions) are sorted into two categories: long-term investors and other investors. Long-term investors are defined as mutual funds (13f institutions) whose trailing four-quarter portfolio churn ratio ranks in the bottom 30th percentile in the cross-section. Stock-level aggregate ownership are calculated as the sum of portfolio-level ownership for long-term investors and for other investors. For each rebalance event, we include the two quarters before the events (*before*) and two quarters after the events (*after*). Panel A shows the results for inclusion events, and Panel B shows the results for exclusion events. Standard errors are clustered at the rebalance event level, and shown in parentheses. *, **, and *** and indicate 10%, 5%, and 1% significance respectively.

Table 6. Long-term investor ownership around FTSE4Good US Index rebalances: Triple difference with matched controls

Panel A: Stock Characteristics

	Inclusion events		Exclusion events	
	Treated group	Control group	Treated group	Control group
Number of stocks	148	148	112	112
FTSE4Good Index membership	N	N	Y	Y
Two-digit SIC industry	Matched	Matched	Matched	Matched
Market capitalization	\$18.9B	\$17.2B	\$20.8B	\$22.3B
	$Prob(Treated = Control) = 0.72$		$Prob(Treated = Control) = 0.44$	
Past 12-month return	14.3%	14.0%	12.8%	11.0%
	$Prob(Treated = Control) = 0.88$		$Prob(Treated = Control) = 0.21$	

Panel B: Triple difference results

	Inclusion events		Exclusion events	
Dependent variable(%)	$\sum_i Holdings_{i,j,t}/SharesOut_j$			
Investor type	Mutual funds	13f Institutions	Mutual funds	13f Institutions
	(1)	(2)	(3)	(4)
D(Long-term)*After Index Rebalance*Treated	2.040***	0.949***	-1.068*	-0.730
	(0.687)	(0.323)	(0.588)	(1.641)
D(Long-term Investors)*After Index Rebalance	-1.472***	0.0922	0.763	0.523
	(0.550)	(1.129)	(0.466)	(1.141)
D(Long-term Investors)*Treated	0.727	1.820	0.676	1.292
	(0.628)	(1.563)	(0.738)	(1.377)
After Index Rebalance*Treated	-0.705	0.907	0.423	0.161
	(0.583)	(1.363)	(0.491)	(1.379)
D(Long-term Investors)	2.383***	11.81***	-3.279***	-12.87***
	(0.650)	(1.663)	(0.567)	(1.363)
After Index Rebalance	0.850**	-1.229	-0.485	0.00157
	(0.382)	(0.926)	(0.323)	(0.808)
Observations	2360	2360	1780	1780
Adjusted R^2	0.043	0.172	0.103	0.259

This table reports the ownership of mutual funds and 13f institutions around the FTSE4Good US Index rebalance events, using a matched sample of stocks as the control group. For each stock involved in the Index balance ("treated" stocks), another stock in the same industry is matched along market capitalization and past return dimensions ("control" stocks). Investors (mutual funds or 13f institutions) are sorted into two categories: long-term investors and other investors. Long-term investors are defined as mutual funds (13f institutions) whose trailing four-quarter portfolio churn ratio ranks in the bottom 30th percentile in the cross-section. Stock-level aggregate ownership are calculated as the sum of portfolio-level ownership for long-term investors and for other investors. For each rebalance event, we include the two quarters before the events (*before*) and two quarters after the events (*after*). Panel A compares the characteristics of treated and control stocks, and Panel B shows the results for the triple difference specifications. Standard errors are clustered at the rebalance event level, and shown in parentheses. *, **, and *** and indicate 10%, 5%, and 1% significance respectively.

Table 7. Mitigating effect of corporate ESG-profile: Fund trading and past returns

Dependent Variable	$Dummy(Sell)_{i,j,t}$		$-\frac{\Delta Holdings_{i,j,t}}{Holdings_{i,j,t-1}}$	
	(1)	(2)	(3)	(4)
Past 12-month Excess Return(-)	-0.124***	-0.132***	-0.398***	-0.412***
	(0.00274)	(0.00283)	(0.00620)	(0.00648)
ESG Score*Past Excess Return(-)	0.00156***	0.00192***	0.00550***	0.00642***
	(0.000545)	(0.000528)	(0.00116)	(0.00124)
ESG Score	-0.000214**	0.000154	0.000438**	0.0000814
	(0.000101)	(0.000113)	(0.000190)	(0.000242)
Return Volatility	-0.0502***	-0.0324***	-0.708***	-0.587***
	(0.00992)	(0.0109)	(0.0209)	(0.0269)
Stock Turnover	3.575***	5.172***	-2.378***	-2.782***
	(0.322)	(0.401)	(0.504)	(1.036)
Ln(Market Cap)	0.0129***	0.0166***	0.0193***	0.0133***
	(0.000552)	(0.00104)	(0.000771)	(0.00224)
Book-to-Market Ratio	-0.0104***	-0.0133***	0.00781***	-0.00269
	(0.00122)	(0.00174)	(0.00212)	(0.00436)
Dividend Yield	0.0555**	0.240***	0.362***	0.342***
	(0.0266)	(0.0391)	(0.0538)	(0.100)
Observations	11261993	11261989	11261993	11261989
Adjusted R^2	0.224	0.225	0.144	0.146
Fund-by-Quarter FE	Y	Y	Y	Y
Stock FE	N	Y	N	Y

This table reports results of regressions of the inter-quarter trading decisions of mutual funds on the stock's previous returns and firm characteristics. The sample only includes positions where the fund's holding in the previous quarter was positive. In Columns (1) and (2), the dependent variable is a dummy that takes the value of one if fund i reduces its holdings of stock j at quarter t. In Columns (3) and (4), the dependent variable is the (negative of) fractional change of fund i's stock j holdings from quarter $t-1$ to quarter t. "Past 12-month Excess Return(-)" is the minimum between the cumulative return of firm i's stock return in excess of market returns during the previous 12 months and zero. All specifications include fund-by-quarter fixed effects. Standard errors are clustered at the stock level, and shown in parentheses. *, **, and *** and indicate 10%, 5%, and 1% significance respectively.

Table 8. Mitigating effect of corporate ESG-profile: Fund trading and earnings shortfalls

Measurement of Earnings Surprise	Seasonal-adjusted Earnings Growth				Deviation from Analyst Forecast			
Dependent Variable	$Dummy(Sell)_{i,j,t}$		$-\frac{\Delta Holdingsi,j,t}{Holdings_{i,j,t-1}}$		$Dummy(Sell)_{i,j,t}$		$-\frac{\Delta Holdings_{i,j,t}}{Holdings_{i,j,t-1}}$	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dummy(Neg. Earnings Surprise)	0.0108***		0.0372***		0.0120***		0.0421***	
	(0.000650)		(0.00154)		(0.000666)		(0.00160)	
Dummy(Neg. Earnings Surprise)*ESG Score	-0.000370***		-0.00152***		-0.000400***		-0.00137***	
	(0.000126)		(0.000296)		(0.000133)		(0.000318)	
Max(-Earnings Surprise,0)		0.359***		1.082***		1.019***		3.187***
		(0.0287)		(0.0706)		(0.0713)		(0.173)
Max(-Earnings Surprise,0)*ESG Score		-0.0119**		-0.0378***		-0.0241*		-0.0742**
		(0.00528)		(0.0134)		(0.0136)		(0.0335)
ESG Score	-0.0000643	-0.000127	0.000986***	0.000676***	-0.0000602	-0.000138	0.000912***	0.000633***
	(0.000104)	(0.0000937)	(0.000222)	(0.000194)	(0.0000991)	(0.0000938)	(0.000217)	(0.000190)
Return Volatility	0.000909	-0.00812	-0.546***	-0.570***	-0.000314	-0.0111	-0.551***	-0.581***
	(0.0102)	(0.0102)	(0.0224)	(0.0225)	(0.0103)	(0.0101)	(0.0223)	(0.0224)
Stock Turnover	4.700***	4.631***	1.223**	1.033**	4.676***	4.599***	1.128**	0.918*
	(0.333)	(0.335)	(0.517)	(0.517)	(0.335)	(0.338)	(0.515)	(0.519)
Ln(Market Cap)	0.0113***	0.0112***	0.0142***	0.0139***	0.0114***	0.0113***	0.0145***	0.0141***
	(0.000551)	(0.000544)	(0.000865)	(0.000860)	(0.000550)	(0.000543)	(0.000860)	(0.000851)
Book-to-Market Ratio	-0.00406***	-0.00469***	0.0279***	0.0265***	-0.00422***	-0.00522***	0.0273***	0.0247***
	(0.00118)	(0.00120)	(0.00228)	(0.00233)	(0.00118)	(0.00122)	(0.00226)	(0.00233)
Dividend Yield	0.0746***	0.0899***	0.418***	0.475***	0.0688***	0.0870***	0.395***	0.465***
	(0.0266)	(0.0266)	(0.0542)	(0.0542)	(0.0267)	(0.0266)	(0.0542)	(0.0538)
Observations	11261993	11261993	11261993	11261993	11261993	11261993	11261993	11261993
Adjusted R^2	0.223	0.223	0.141	0.141	0.223	0.223	0.141	0.141
Fund-by-Quarter FE	Y	Y	Y	Y	Y	Y	Y	Y

This table reports the results of regressions of the inter-quarter trading decisions of mutual funds on the recent earnings surprises and characteristics of the firm. The sample only includes positions where the fund's holding in the previous quarter was positive. In Columns (1), (2), (5), and (6) the dependent variable is a dummy that takes the value of one if fund i reduces its holdings of stock j at quarter t. In Columns (3), (4), (7) and (8) the dependent variable is the (negative of) the fractional change of fund i's stock j holdings from quarter $t-1$ to quarter t. Earnings shortfall is measured as either a dummy variable indicating negative earnings surprise, or a continuous variable $Max(-EarningsSurprise, 0)$. All specifications include fund-by-quarter fixed effects. Standard errors are clustered at stock level, and shown in parentheses. *, **, and *** and indicate 10%, 5%, and 1% significance respectively.

Table 9. Fund trading and earnings shortfalls: Before and after FTSE4Good US Index rebalance

Measurement of Earnings Surprise	Seasonal-adjusted Earnings Growth		Deviation from Analyst Forecast	
Dependent Variable	$Dummy(Sell)_{i,j,t}$	$-\frac{\Delta Holdingsi,j,t}{Holdings_{i,j,t-1}}$	$Dummy(Sell)_{i,j,t}$	$-\frac{\Delta Holdingsi,j,t}{Holdings_{i,j,t-1}}$
	(1)	(2)	(3)	(4)
D(Neg. Earnings Surprise)	0.0199***	0.0315***	0.0324***	0.0420***
	(0.00330)	(0.00332)	(0.00370)	(0.00372)
D(Neg. Earnings Surprise)*Post Event	-0.00658	-0.00760*	-0.0101*	-0.0145***
	(0.00460)	(0.00459)	(0.00532)	(0.00540)
Post FTSE4GooD Reconstitution Event	-0.000864	-0.00294	-0.000432	-0.00215
	(0.00233)	(0.00229)	(0.00211)	(0.00209)
Observations	286587	286587	286587	286587
Event-Stock Fixed Effects	Y	Y	Y	Y

This table displays the sensitivities of mutual funds' selling decisions with respect to earnings shortfalls, focusing on stocks that are included or excluded from the FTSE4Good US Index. For stocks that are included into the Index, Quarter t-4 to Quarter t-1 are defined as "pre" periods, and Quarter t+1 to Quarter t+4 are defined as "post" periods. For stocks that are excluded from the Index, the converse is true. $D(Neg.EarningsSurprise)$ is a dummy indicating the quarterly earnings surprise is negative. All specifications include event-stock fixed effects. Standard errors are clustered at the stock level, and shown in parentheses. *, **, and *** and indicate 10%, 5%, and 1% significance respectively.

Table 10. Panel regressions of investor ownership on a firm's ESG score

	Actively-Managed Mutual Funds				13f Institutions			
Dependent variable(%)	$Ownership_{t+1}$	$Ownership_{t+1}$	$\Delta Ownership_{t+1}$	$Breadth_{t+1}$	$Ownership_{t+1}$	$Ownership_{t+1}$	$\Delta Ownership_{t+1}$	$Breadth_{t+1}$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ESG Score	-0.151***	-0.213***	0.0256***	0.0750***	-0.551***	-0.725***	0.00147	0.155***
	(0.0454)	(0.0570)	(0.00977)	(0.0226)	(0.112)	(0.142)	(0.0176)	(0.0494)
ESG Score * Post-2010		0.167***				0.473***		
		(0.0619)				(0.143)		
Log(Market Cap)	1.089***	1.066***	-0.261***	1.902***	2.967***	2.902***	-0.278***	3.666***
	(0.124)	(0.123)	(0.0248)	(0.0586)	(0.320)	(0.320)	(0.0486)	(0.130)
Book-to-Market Ratio	-0.421*	-0.452*	-0.321***	0.280***	3.784***	3.696***	-0.255**	0.517***
	(0.235)	(0.236)	(0.0603)	(0.0602)	(0.562)	(0.562)	(0.128)	(0.110)
Dividend Yield	-0.837***	-0.837***	0.0169	-0.119***	-2.429***	-2.430***	-0.00627	0.0262
	(0.0547)	(0.0547)	(0.0136)	(0.0173)	(0.139)	(0.140)	(0.0270)	(0.0326)
Profitability Ratio	0.131***	0.131***	-0.00400*	0.00975***	0.264***	0.264***	-0.0102**	0.00193
	(0.00873)	(0.00872)	(0.00209)	(0.00198)	(0.0216)	(0.0216)	(0.00457)	(0.00397)
Past 12-month Return	0.0163***	0.0162***	0.0106***	0.0154***	0.0355***	0.0352***	0.00932***	0.0194***
	(0.00135)	(0.00135)	(0.000821)	(0.000382)	(0.00334)	(0.00334)	(0.00161)	(0.000592)
Return Volatility	-0.0359**	-0.0365**	-0.0207***	0.0104**	0.0523	0.0506	0.0528***	0.0336***
	(0.0166)	(0.0166)	(0.00595)	(0.00436)	(0.0446)	(0.0446)	(0.0117)	(0.00812)
Stock Turnover	-0.722***	-0.727***	-0.701***	-0.316***	0.667	0.654	-1.595***	-0.534***
	(0.273)	(0.273)	(0.0835)	(0.0726)	(0.864)	(0.864)	(0.198)	(0.144)
SP500 Dummy	-3.112***	-3.165***	0.219***	0.737***	-0.303	-0.453	0.0962	3.272***
	(0.386)	(0.387)	(0.0805)	(0.118)	(0.928)	(0.926)	(0.145)	(0.230)
Observations	21870	21870	21870	21870	21870	21870	21870	21870
Adjusted R^2	0.146	0.146	0.092	0.707	0.143	0.143	0.209	0.776
Year Fixed-Effects	Y	Y	Y	Y	Y	Y	Y	Y

This table reports the results of regressions of ownership breadth, aggregate investor ownership, and change in ownership on firms' MSCI ESG scores and control variables. The observations are at firm-year level. Columns (1)-(4) show results for the ownership of all actively-managed mutual funds. Columns (5)-(8) show results for the ownership of all 13f institutions. Ownership breadth is defined as the number of investors holding a firm's shares scaled by the total number of investors in the cross-section for that period. "ESG Score" is the firm's MSCI ESG Score. "Post-2010" is a dummy variable indicating time periods after the Year 2010. Year fixed-effects are included across specifications. Standard errors are clustered at stock level, and shown in parentheses. *, **, and *** and indicate 10%, 5%, and 1% significance respectively.