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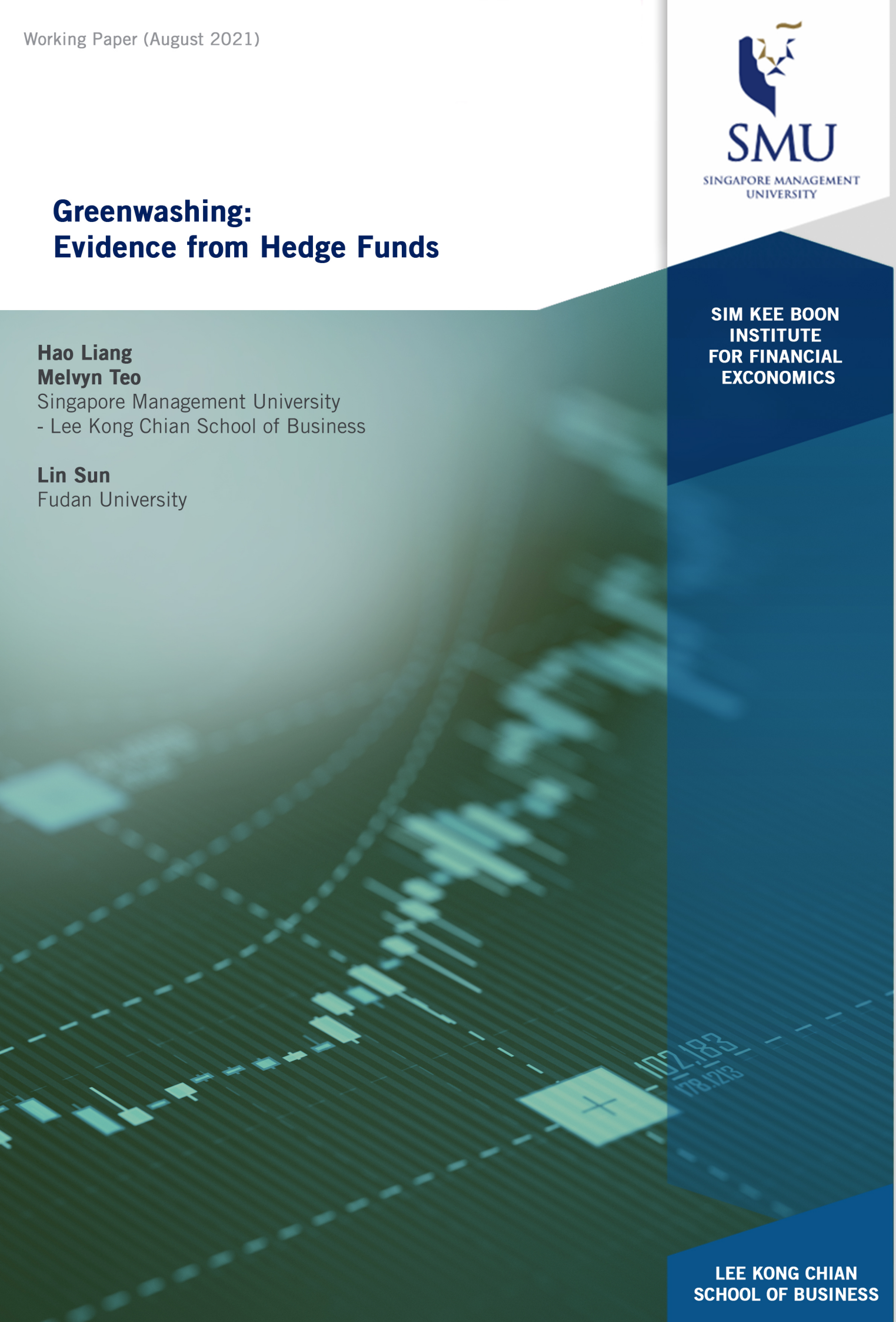

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Greenwashing: Evidence from Hedge Funds

Hao Liang, Lin Sun, and Melvyn Teo☆

Abstract

We find that a non-trivial number of hedge funds that endorse the United Nations Principles for Responsible Investment indulge in greenwashing. Hedge funds that greenwash underperform both genuinely green and nongreen funds after adjusting for risk. Consistent with an agency explanation, greenwashers (i) underperform more when incentive alignment is poor, (ii) trigger more regulatory violations, and (iii) report more suspicious returns. By exploiting regulatory reforms that aim to enhance stewardship and curb greenwashing, we provide causal evidence that relates agency problems to greenwashing and fund underperformance. Investors, however, do not appear to discriminate between greenwashers and genuinely green funds.

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1. Introduction

"As *greenwashing* by companies and fund managers has ramped up, regulators, policymakers and standard-setters have turned their attention to how investors can decipher sustainable investment products."

– Financial Times, 10 March 2021[1]

Responsible investment is the approach to managing assets whereby investors incorporate environmental, social, and governance (henceforth ESG) factors into their investment and ownership decisions. For investment managers, a popular way to signal one's commitment to responsible investment is to endorse the United Nations Principles for Responsible Investment (henceforth PRI). Attesting to the spectacular growth in responsible investment, the assets under management of PRI signatories have ballooned to US$103.4 trillion in 2020.

Given the unprecedented interest in responsible investment, one concern is that some fund managers may deceptively endorse the PRI to attract flows from responsible investors while not incorporating ESG into their investment decisions. To put it bluntly, managers may engage in greenwashing.[2] Since the interests of managers that greenwash are not aligned with those of their investors, greenwashing should be *symptomatic* of agency problems, which could engender fund underperformance. In that case, managers that greenwash will fall short on their dual mandate of delivering investment performance and ESG exposure (Hart and Zingales, 2017). If investors do not differentiate between greenwashers and genuinely green funds, greenwashing could have important implications for investor welfare.

Practitioners and regulators have raised concerns about greenwashing. Christopher Hohn of The Children's Investment fund has accused major asset managers that commit to sustainable investing of being "*full of greenwash*" while Chamath Palihapitiya of Social Capital observes that the ESG movement has been used by some as a "*marketing ploy and a way*

[1] "Greenwashing in finance: Europe's push to police ESG investing," Financial Times, 10 March 2021.

[2] Greenwashing is the practice of trying to make people believe that a company is doing more to adopt sustainability than it really is, often for public relations reasons. See https://www.robeco.com/sg/key-strengths/sustainable-investing/glossary/greenwashing.html.

for companies to get free money." Fueled by concerns that greenwashing could undermine sustainable finance, regulators in the US, Europe, Japan, and Singapore are considering new rules to tackle greenwashing.[3]

Since greenwashing implies that financial intermediaries do not follow through on their commitment to invest responsibly, it could impede the process, envisaged in the theoretical models of Pástor, Stambaugh, and Taylor (2021) and Pedersen, Fitzgibbons, and Pomorski (2021), by which asset prices incorporate investors' tastes for green (and brown) assets.[4] Despite the unprecedented demand for responsible investment, the concerns voiced by practitioners and regulators about greenwashing, and its potential impact on investor welfare and asset prices, we know little about the financial implications of greenwashing. We fill this void by exploring greenwashing among hedge fund firms that endorse the PRI.

The hedge fund industry is an important laboratory for studying greenwashing for three reasons. First, as some of the world's most sophisticated investors (Brunnermeier and Nagel, 2004), hedge funds collectively manage US$3.6 trillion in assets and form an integral part of the portfolios of pension funds, sovereign wealth funds, charitable foundations, and university endowments, many of whom have embraced responsible investing.[5] As a testament to the importance of hedge funds for responsible institutional investors, the PRI offers tools to help such investors incorporate ESG factors into their hedge fund selection process.[6] In contrast, the PRI does not provide similar tools to aid in mutual fund selection. Second, relative to mutual funds, the complex strategies employed by hedge funds and their lower levels of transparency, disclosure, and regulatory oversight amplify the potential for agency problems and opportunistic behavior, thereby increasing the likelihood of greenwashing. Third, compared to hedge fund investors, hedge fund managers are substantially more skeptical about

[3]See "Hedge fund TCI vows to punish directors over climate change," Financial Times, 2 December 2019; "ESG investing is a 'complete fraud,' Chamath Palihapitiya says," CNBC, 26 February 2020; "ESG funds draw SEC scrutiny," Wall Street Journal, 16 December 2019; "ESG funds might soon have to prove to SEC they're actually ESG," Bloomberg, 3 March 2020; "EU markets cop seeks rules on ESG ratings to avoid greenwashing," Bloomberg, 29 January 2021; "A $9 billion Mizuho fund sparks review of ESG labels in Japan," Bloomberg, 3 March 2021; "Singapore to tackle greenwashing, carbon trading to boost sustainable finance: MAS," The Business Times, 4 December 2020.

[4]Green assets belong to firms that generate positive externalities for society while brown assets belong to firms that impose negative externalities on society.

[5]See https://www.hfr.com/sites/default/files/articles/4Q20_HFR_GIR.pdf.

[6]See https://www.unpri.org/investor-tools/hedge-funds.

the importance of ESG. As shown in Figure 1, in a 2018 Preqin poll, 65% of hedge fund investors indicate that they believe that ESG will become more important over the next five years. Yet, only 37% of hedge fund managers believe the same. We do not observe a similar dissonance in beliefs between other alternative investment managers and their investors. The sharp divergence in beliefs between hedge fund managers and investors raises the possibility that hedge fund managers will indulge in greenwashing.

[Insert Figure 1 here]

To test for evidence of greenwashing among hedge funds, we first compute the value-weighted portfolio level ESG scores for hedge fund management companies by leveraging on Refinitiv (formerly Thomson Reuters ASSET4) stock ESG scores and stock holdings data.[7] We find that while hedge fund signatories *on average* exhibit greater ESG exposures than do nonsignatories, there is significant overlap in the distributions of their ESG exposures. By our estimates, a non-trivial 20.79% of hedge fund signatories or US$181 billion of hedge fund assets have ESG exposures below that of the median hedge fund firm. These results question the view that signatories are always exemplars of responsible investment.

Next, we classify hedge fund signatories with low-ESG exposure, based on their stock holdings, as greenwashers.[8] Our greenwashing classification is similar to that of Kim and Yoon (2020) and Gibson, Glossner, Krueger, Matos, and Steffen (2021), and is consistent with subsequent firm ESG-related shareholder proposal voting behavior.[9] In line with the view that low-ESG signatories greenwash, the vast majority of such signatories include ESG-related keywords on their websites and do not improve their ESG exposures year-on-year.

[7] Investment management firm ESG scores, as opposed to fund ESG scores, are relevant for our purposes as greenwashing is a firm-level decision as opposed to a fund-level decision. Moreover, agency problems, if any, should manifest at the fund management company level and not just at the fund level.

[8] We define low-ESG signatories as those with bottom-tercile ESG scores and define high-ESG signatories as those with top-tercile ESG scores. Our results are robust to classifying as low-ESG signatories those with below-median ESG scores and as high-ESG signatories those with above-median ESG scores.

[9] According to the PRI, screening (including negative and positive screening) remains one of the most widely used approaches for implementing a responsible investment policy. Therefore, for an investor, having significant exposure to low-ESG firms is, in the absence of shareholder engagement, inconsistent with the successful implementation of a responsible investment policy. We provide supplementary evidence which suggests that low-ESG signatories *do not* subsequently improve the ESG of their underlying holdings, via shareholder engagement for instance.

Moreover, the low-ESG signatories that we classify as greenwashers do indeed have genuinely low ESG scores; their average ESG score falls in the bottom tercile of the stock universe. While hedge funds may hold other securities such as corporate bonds, unlike bonds, stocks represent ownership claims on firms. Therefore, we argue that stock ownership (as opposed to bond ownership) provides a much stronger endorsement of a company's ESG practices.[10]

To investigate the investment implications of greenwashing, we show first that hedge funds managed by PRI signatories underperform other hedge funds by 2.45% per annum (t-statistic = 3.93) after adjusting for co-variation with the Fung and Hsieh (2004) seven factors. The underperformance of hedge fund signatories can be traced to signatories that greenwash, i.e., those with low ESG scores. Specifically, low-ESG signatory hedge funds underperform low-ESG nonsignatory hedge funds by an economically significant 7.72% per annum (t-statistic = 3.18) after adjusting for risk. In contrast, the risk-adjusted performance spread between high-ESG signatory and nonsignatory funds is an economically modest 0.54% per annum (t-statistic = 0.74). Moreover, low-ESG signatories underperform high-ESG signatories by a risk-adjusted 5.94% per year (t-statistic = 3.00). Therefore, funds that greenwash underperform both genuinely green funds (those managed by high-ESG signatories) and nongreen funds (those managed by low-ESG nonsignatories).

The results are not driven by the usual suspects that affect hedge fund performance, including fund age (Aggarwal and Jorion, 2010), fund incentive fee (Agarwal, Daniel and Naik, 2009), fund size (Ramadorai, 2013), past fund performance (Kosowski, Naik, and Teo, 2007), serial correlation (Getmansky, Lo, and Makarov, 2004), incubation bias (Fung and Hsieh, 2009) and backfill bias (Bhardwaj, Gorton, and Rouwenhorst, 2014). After adjusting for the explanatory power of fund characteristics, low-ESG signatory funds underperform low-ESG nonsignatory funds by a risk-adjusted 3.11% per annum (t-statistic = 2.92).

The findings are also robust to alternative ways of evaluating exposure to responsible companies. We obtain qualitatively similar results when we employ the Refinitiv ESG component score based on environmental and social (henceforth E&S) factors and that based on corporate governance factors or leverage on ESG data from MSCI ESG STAT and Sus-

[10]Unlike hedge fund stock holdings, hedge fund corporate bond holdings are not easily available from commercial databases.

tainalytics. Moreover, inferences remain qualitatively unchanged when we augment the performance evaluation model with factor-mimicking stock portfolios for ESG, CO_2 emissions (Bolton and Kacperczyk, 2021), and toxic emissions (Hsu, Li, and Tsou, 2020) as well as the Carhart (1997) momentum factor, the Fama and French (2015) profitability and investment factors, the Pástor and Stambaugh (2003) liquidity factor, the Frazzini and Pedersen (2014) betting-against-beta factor, the Bali, Brown, and Caglayan (2014) macroeconomic uncertainty factor, the Agarwal and Naik (2004) call and put option based factors, the Buraschi, Kosowski, and Trojani (2014) correlation risk factor, and an emerging markets factor.

To test whether the underperformance of signatories that greenwash is related to agency problems, we redo the baseline performance sorts for hedge funds partitioned by fund incentive alignment metrics. Prior work suggests that hedge funds with low manager total deltas (Agarwal, Daniel, and Naik, 2009), high management fees to performance fees (Fung, Hsieh, Naik, and Teo, 2021), and low governance scores (Ozik and Sadka, 2015) are more susceptible to agency problems. Consistent with the agency view, we find that the underperformance of low-ESG hedge fund signatories is larger for precisely such funds.

To further investigate the agency view, we test whether greenwashing provides insight into other aspects of managerial opportunism (Ali and Hirshleifer, 2017). We show that low-ESG signatories exhibit greater operational risk. Specifically, low-ESG signatories are more likely to disclose new regulatory actions, investment infractions, and severe violations on their Form ADVs (Brown, Goetzmann, Liang, and Schwarz, 2008; 2009; 2012), suggesting that they deviate from expected standards of business conduct or cut corners when it comes to compliance. Moreover, they are more likely to report fund returns that feature a discontinuity around zero, a paucity of negative returns, and a high number of repeated returns, transgressions that may be indicative of return misreporting and fraud (Bollen and Pool, 2009; 2012).[11] These results are again broadly consistent with the agency view.

There are concerns that unobserved factors *unrelated to agency* could drive both greenwashing and fund performance. For example, unskilled hedge funds could endorse the PRI to compensate for their inability to outperform and unintentionally mismanage ESG im-

[11] As Jorion and Schwarz (2014) note, one caveat is that a return discontinuity around zero may instead reflect the imputation of incentive fees.

plementation. To tackle such endogeneity concerns, we exploit the staggered adoption of stewardship codes in the countries where hedge funds are based. The stewardship codes ratchet up the pressure on fund managers to mitigate conflicts of interests and improve transparency and engagement, thereby reducing via the agency channel the propensity for them to greenwash. In line with this view, we find that the ESG exposures of low-ESG signatories increase in the three-month period post stewardship code adoption. If greenwashing leads to fund underperformance through the agency channel, we expect that the adoption of the stewardship codes will ameliorate the underperformance of funds that hitherto indulged in greenwashing. This is precisely what we find. Low-ESG signatories underperform less in the three-month period following the adoption of such codes. We show further that the results are not simply the by-product of the increase in ESG exposures post stewardship code adoption directly affecting the returns of low-ESG signatories.

To further address endogeneity issues, we leverage on the revisions made by the US Federal Trade Commission (henceforth FTC) to its Green Guides on October 2012. The revised Green Guides are designed to help marketers ensure that the claims that they make about the environmental attributes of their products are truthful and non-deceptive. Under Section 5 of the FTC Act, the FTC can take enforcement action against deceptive claims. While the Green Guides focus on the marketing of physical products, one could reasonably infer that the revisions signal the FTC's intent to ramp up enforcement pressure on greenwashing in general. Therefore, the revisions should curb greenwashing for funds that are marketed to US investors. Moreover, by aligning fund manager incentives with those of responsible fund investors, via the threat of enforcement actions by the FTC, the revisions should at least temporarily also help mitigate agency problems at signatories that greenwash. We find that in the three-month period following the revisions, unlike high-ESG US signatories, low-ESG US signatories increase their ESG exposures *and* improve their investment performance. These results suggest that our findings are not driven by omitted variables unrelated to agency that affect both greenwashing and fund performance.

Investors do not in general differentiate between signatories that greenwash and those that are truly green. After adjusting for past fund performance and other usual suspects, signatories attract an economically and statistically meaningful 19.70% more flows per annum

than do nonsignatories. These results suggest that PRI endorsement facilitates asset gathering and echo those of Hartzmark and Sussman (2019) on mutual funds. More interestingly, low-ESG signatories attract as much fund flows as do high-ESG signatories after controlling for past performance and other factors. In addition, there is no discernible difference in the sensitivity of flows to past performance for low- versus high-ESG signatories.

Why do low-ESG signatories continue to thrive despite not walking the talk? There are several reasons why greenwashers may persist. First, there is considerable disagreement between data vendors when it comes to the inherently subjective ESG ratings. Therefore, low-ESG signatories are unlikely to face significant litigation risk. Second, low-ESG signatories only differ marginally from high-ESG signatories along more salient dimensions such as sin stock ownership (Hong and Kacperczyk, 2009). Without appealing to data from ESG vendors, it would not be easy for investors to assess signatory ESG exposure. Third, low-ESG signatories market their funds more aggressively, thereby reducing investor search costs. Fourth, low-ESG signatories tend to attract more unsophisticated investors such as high-net worth individuals who lack the financial wherewithal to accurately assess ESG exposure.

To gauge external validity, we study actively managed US equity mutual funds. Given the higher level of transparency, disclosure, and regulatory oversight for mutual funds, which curbs agency problems and deters opportunistic behavior, we expect to find weaker results for mutual funds. Nonetheless, for mutual funds with poor incentive alignment, our central finding that low-ESG signatories underperform still holds, suggesting that agency problems also drive the underperformance of mutual funds that greenwash.

The findings provide novel insights relative to research that shows that socially responsible mutual funds, venture capital funds, and university endowments underperform due to their greater exposure to socially responsible firms (Riedl and Smeets, 2017; Barber, Morse, and Yasuda, 2021; Aragon, Jiang, Joenväärä, and Tiu, 2020). By showing that managers who indulge in greenwashing underperform, we uncover a different channel, i.e., agency, which can engender underperformance in purportedly socially responsible managers.

We build on two research themes on hedge funds. The first theme studies agency problems and finds that some hedge funds inflate year-end returns, take on excessive liquidity risk,

revise their reported returns downwards, and delay reporting poor performance (Agarwal, Daniel, and Naik, 2011; Teo, 2011; Patton, Ramadorai, and Streatfield, 2015; Aragon and Nanda, 2017). Unlike these papers, we identify problem funds by exploiting the dissonance between what investment firms say they do and what they actually do. The second theme examines fund alpha and finds that less incentivized, older, high R-squared, and nondistinctive hedge funds, as well as those with less talented managers and launched in a popular strategy underperform (Agarwal, Daniel, and Naik, 2009; Aggarwal and Jorion, 2010; Titman and Tiu, 2011; Li, Zhang, and Zhao, 2011; Sun, Wang, and Zheng, 2012, Cao, Farnsworth, and Zhang, 2021). By showing that hedge funds that greenwash also underperform, our results speak to the importance of manager motivation (versus manager skill) as a driver of alpha. Our results are tangential to work on activism and firm ESG performance (Akey and Appel, 2020; DesJardine and Durand, 2020; DesJardine, Marti, and Durand, 2021). The findings are qualitatively similar when we employ forward-looking ESG measures to identify greenwashers or when we exclude activists.[12]

This study complements Kim and Yoon (2020) and Gibson et al. (2021) who broadly investigate mutual fund firms and institutional investors, respectively, that endorse the PRI, but do not focus on greenwashing.[13] That said, Kim and Yoon (2020) find that mutual funds on average do not improve their fund-level ESG performance post endorsement, which they argue is suggestive of greenwashing, while Gibson et al. (2021) find some evidence of greenwashing, albeit only for US-based institutional investors. However, unlike us, they neither exploit valuable information in the *cross-section* of signatory ESG exposure nor study the investment performance, operational risk, and asset gathering implications of greenwashing at the signatory level. A key contribution of our work is that we relate greenwashing to fund underperformance, incentive misalignment, disciplinary disclosures, suspicious fund returns, investor flows, and exogenous shocks that impact fund management company ESG practices.

[12]The forward-looking measures of ESG exposure help address the possibility that some hedge funds, e.g., shareholder activists, may invest in companies with a view towards improving company ESG performance. We note that the vast majority of the hedge funds in our sample are not activists. Of the 307 hedge fund signatories in our sample, only 42 operate activist hedge funds.

[13]Both studies find marginal differences in performance between signatories and nonsignatories. See Table IA.7 in Gibson et al. (2021) and Tables 8 and 11 in Kim and Yoon (2020). By focusing on hedge funds, which feature lower levels of transparency, disclosure, and regulatory oversight, and are consequently more likely to greenwash, we obtain stronger evidence of signatory underperformance.

By doing so, we advance the agency view and deepen our understanding of greenwashing.[14]

One caveat is that while we show that low-ESG signatories are not more likely to improve the ESG of their underlying stock holdings nor are they more likely to vote on an ESG-related proposal, and that our findings are robust to multiple ways of measuring ESG exposure (which includes employing data from multiple ESG data vendors), some of the low-ESG signatories that we classify as greenwashers may not be greenwashing. For instance, some of them may compensate for their low-ESG stock exposures by providing financing to high-ESG companies, via the ownership of their corporate bonds. Stock holdings represent ownership claims on firms and, therefore, stock ownership signals a much stronger endorsement of a firm's ESG practices relative to bond ownership. Nonetheless, our findings should be considered in light of this limitation.

2. Data and methodology

2.1. United Nations Principles for Responsible Investment

The United Nations PRI is the world's leading proponent of responsible investment. It was established on 27 April 2006, with 21 original institutions and 51 founding signatories. The 21 original institutions, or drafting signatories, include institutional investors such as CalPERS, Hermes Pensions Management, and the Norwegian Government Pension Fund. Figure 2 showcases the phenomenal growth in the number and assets under management of PRI signatories since 2006. By December 2020, more than 3,000 asset owners, invest-

[14] We note that Flammer (2021) finds little evidence of greenwashing in the context of green bond issuance. In corporate finance, Li and Wu (2020) show that agency conflicts moderate the effectiveness of corporate social responsibility engagements. Our work also resonates with the management literature on corporate greenwashing, which typically examines the factors underlying corporate greenwash (e.g., Delmas and Burbano (2011), Parguel, Beniot-Moreau, and Larceneux (2011), and Lyon and Montgomery (2013)) but rarely studies the impact of greenwashing on firm metrics. Exceptions include Walker and Wan (2012) who relate greenwashing to lower return on assets for visibly polluting Canadian firms and Du (2015) who associate greenwashing with poorer stock returns for Chinese firms. However, their results are puzzling as they question the rationality of corporate managers that greenwash. Moreover, none of the studies provide causal evidence linking greenwash to firm performance. Our paper answers Lyon and Montgomery's (2015) call for "*thorough, careful empirical analysis on the impacts of greenwash.*" Unlike prior work, we provide insights into the causal mechanism relating greenwashing to investment performance, and show that managers can benefit from greenwashing, via greater investor flows.

ment managers, and service providers have joined the PRI network, and total assets under management by PRI signatories have exceeded US$103 trillion.

[Insert Figure 2 here]

Information available on the PRI website includes the signatory's name, category (investment manager, asset owner, or service provider), headquarter, signature date, organizational overview, strategy and governance, and reporting practice. PRI also provides its own assessments of its signatories based on their reports on their responsible investment activities with respect to asset-specific modules in the PRI reporting framework. Given that PRI's own assessment is based on self-reported data, we use ESG ratings from leading data providers, such as Refinitiv, MSCI, and Sustainalytics, to more objectively assess ESG exposure.

PRI signatories are expected to adhere to the following six principles for responsible investment: (I) to incorporate ESG issues into investment analysis and decision-making processes; (II) to be active owners and incorporate ESG issues into ownership policies and practices; (III) to see appropriate disclosure on ESG issues by the entities in which they invest; (IV) to promote acceptance and implementation of the Principles within the investment industry; (V) to work together to enhance effectiveness in implementing the Principles; (VI) to report their activities and progress towards implementing the Principles.

According to the PRI, most listed equity and fixed income investors use screening as part of their investment process.[15] This implies that signatories should either avoid low-ESG companies (negative screening) or load up on high-ESG companies (positive screening) to adhere to Principle (I). In either case, this suggests that, in the absence of engagement, signatories with significant exposure to low-ESG companies are not adhering to a key principle for responsible investment and are, therefore, likely to be greenwashing.

[15] See https://www.unpri.org/an-introduction-to-responsible-investment/an-introduction-to-responsible-investment-screening/5834.article.

2.2. Hedge fund data

We evaluate hedge funds using monthly net of fee returns and assets under management data of live and dead hedge funds reported in the Hedge Fund Research (HFR) and Morningstar data sets from May 2006 to April 2019. The start of our sample period, May 2006, corresponds to the first full month that follows the establishment of the PRI.

Our fund universe has a total of 16,001 hedge funds, of which 3,881 are live funds and 12,120 are dead funds. We exclude duplicate share classes from the sample due to concerns that funds with multiple share classes could cloud the analysis.[16] This leaves a total of 11,387 hedge funds, of which 2,911 are live funds and 8,476 are dead funds. There are 3,389 and 1,703 funds unique to the HFR and Morningstar databases, respectively, underscoring the advantage of obtaining data from more than one source. In addition to monthly return and size, our sample captures data on fund characteristics such as management fee, performance fee, redemption notice period, minimum investment, investment style, and age.[17]

We download the complete list of signatories from the PRI website. The signatory directory provides information on account name, signatory category, headquarter country, and signing date. During our sample period, which starts from May 2006 with the first batch of signatories and ends in April 2019, there are 2,321 PRI signatories. We manually connect PRI signatories to hedge fund management companies by matching on name and headquarter country. We are able to identify 307 such fund management company matches.

Panel A of Table 1 reports summary statistics on the number of PRI signatory and nonsignatory hedge fund firms, as well as the number of hedge funds and the assets that they manage. At the end of the first year of our sample period, in December 2006, there are 16 signatory hedge fund firms operating 90 hedge funds with US$26.23 billion in AUM. By the end of the sample period, in April 2019, there are 174 PRI signatory hedge fund firms

[16] Inferences do not change when we include multiple share classes of the same fund in the analysis. To merge databases, we follow the procedure outlined in the Appendix of Joenväärä, Kauppila, Kosowski, and Tolonen (2021).

[17] To ameliorate the impact of return outliers, we winsorize the hedge fund returns in our sample at the 0.5th and 99.5th percentiles. The baseline results are virtually unchanged when we use the original returns reported in the databases.

managing 489 hedge funds with US$315.60 billion in AUM. This represents an impressive 11-fold increase in signatory hedge fund assets. During this period, the signatory hedge fund assets increased from a modest 2.71% to a sizeable 29.54% of all hedge fund assets.

[Insert Table 1 here]

Following Joenväärä et al. (2021), we classify funds into 12 investment styles: CTA, Emerging Markets, Event Driven, Global Macro, Long/Short, Long Only, Market Neutral, Multi-Strategy, Relative Value, Short Bias, Sector, and Others. CTA funds aim to profit from technical or fundamental-based strategies in commodity markets. Emerging Markets funds typically invest in Emerging Market equities. Event Driven funds take advantage of significant corporate events, such as spin-offs, mergers and acquisitions, bankruptcy reorganizations, recapitalizations, and share buybacks. Global Macro funds bet on the direction of market prices of currencies, commodities, equity indices, and bond indices in the futures and cash markets. Long/Short funds take long and short positions in undervalued and overvalued stocks, respectively. Long Only funds take up long only positions in stocks. Market Neutral funds maintain a net zero exposure to the equity market while going long and short stocks. Multi-Strategy funds engage in multiple strategies. Relative Value funds take positions on spread relations between prices of financial assets and aim to minimize market exposure. Short Bias funds maintain a net short position in equity markets. Sector funds focus on specific sectors or industries. Funds that do not fit into these 11 investment styles are classified as Others. Our investment strategy classification is more granular than that employed by Agarwal, Daniel, and Naik (2009).

As listing on commercial databases is not mandatory for hedge funds, hedge fund data are susceptible to self-selection biases. For example, hedge funds often include returns prior to fund listing dates onto the databases. Because funds that have good track records tend to go on to list on databases so as to attract investment capital, the backfilled returns tend to be higher than non-backfilled returns, which leads to a backfill bias (Liang, 2000; Fung and Hsieh, 2009; Bhardwaj, Gorton, and Rouwenhorst, 2014). To alleviate concerns about backfill bias, we will also analyze hedge fund returns reported post fund database listing date. For funds from databases that do not provide listing date information, we rely on the

Jorion and Schwarz (2019) algorithm to back out fund database listing dates. In addition, hedge funds are often launched with internal capital. Only successful hedge funds go on to attract capital from external investors. To alleviate this incubation bias, we will also redo our tests after removing the first 24 months of returns reported by each fund.

We model the risk of hedge funds using the Fung and Hsieh (2004) seven-factor model. The Fung and Hsieh factors are the excess return on the Standard and Poor's (S&P) 500 index (SNPMRF); a small minus big factor (SCMLC) constructed as the difference between the Russell 2000 and S&P 500 stock indexes; the change in the constant maturity yield of the US ten-year Treasury bond, appropriately adjusted for the duration of the ten-year bond (BD10RET); the change in the credit spread of Moody's BAA bond over the ten-year Treasury bond, also appropriately adjusted for duration (BAAMTSY); and the excess returns on portfolios of lookback straddle options on currencies (PTFSFX), commodities (PTFSCOM), and bonds (PTFSBD), which replicate the payoffs from trend-following strategies on their respective underlying assets.[18] Fung and Hsieh (2004) show that these seven factors have considerable explanatory power on aggregate hedge fund returns.

2.3. ESG data

We calculate firm ESG performance primarily using Refinitiv data (formerly Thomson Reuters ASSET4). The database has been employed by Ferrell, Liang, and Renneboog (2016), Liang and Renneboog (2017), and Dyck, Lins, Roth, and Wagner (2019), among others. The Refinitiv ESG ratings measure a company's relative ESG performance, commitment, and effectiveness across ten main themes: environmental resource use, environmental emissions, environmental product innovation, workforce, human rights, community, product responsibility, management, shareholders, and CSR strategy. The ratings are derived from more than 400 company-level ESG metrics, which are based on information from annual reports, company websites, non-profit organization websites, stock exchange filings, corporate social responsibility reports, and news sources. The process entails a series of data entry

[18] David Hsieh kindly supplied these risk factors. The trend-following factors can be downloaded from http://faculty.fuqua.duke.edu/%7Edah7/DataLibrary/TF-Fac.xls.

checks, automated quality rules, sample audits on a daily basis, and management review. The ESG ratings are reported as percentile scores ranging from 0 to 100. To calculate the percentile scores, Refinitiv evaluates firm E&S ratings relative to firms in the same Refinitiv Business Classification industry and assesses firm governance ratings relative to other firms in the same country. One concern is that Refinitiv ESG percentile ratings are rescaled and adjusted every year, especially as more equity indices are included in the sample. Therefore, ESG scores measured at distant points in time may not be comparable. In our analysis, we will determine the relative ESG exposure of fund management companies *each year* to avoid comparing ESG ratings measured at distant points in time.

We complement the Refinitiv ESG data with data from MSCI ESG STAT (formerly Kinder, Lydenberg, Domini & Co) and Sustainalytics. The MSCI ESG score is based on strength and concern ratings for seven qualitative issue areas, which include community, corporate governance, diversity, employee relations, environment, human rights, and product, as well as concern ratings for six controversial business issue areas, namely, alcohol, gambling, firearms, military, nuclear power, and tobacco. Following Deng, Kang, and Low (2013), Servaes and Tamayo (2013), and Lins, Servaes, and Tamayo (2017), we count the number of strengths and concerns within each issue area and subtract the number of concerns from the number of strengths to construct the raw score for each issue area in each year. The overall raw ESG score is the sum of the raw scores across the 13 issue areas. As the potential number of strengths and concerns within each issue area can differ (Mănescu, 2011), to facilitate consistent comparisons cross-sectionally and over time, we divide the number of strengths and concerns for each firm-year by the maximum possible number of strengths and concerns in the issue area, respectively, to get the adjusted strength and concern scores. We then subtract the adjusted concern score from the adjusted strength score to obtain the adjusted ESG score for the issue area that year.

The Sustainalytics ESG ratings gauge how well companies manage ESG issues and provide an assessment of firms' ability to mitigate risks and capitalize on opportunities. Sustainalytics assesses a company's ESG engagement along four dimensions: preparedness – assessments of company management systems and policies designed to manage material ESG risks, disclosure – assessments of whether company reporting meets international best

practice standards and is transparent with respect to most material ESG issues, quantitative performance – assessments of company ESG performance based on quantitative metrics such as carbon intensity, and qualitative performance – assessments of company ESG performance based on the controversial incidents that the company is involved in.

To measure investment firm ESG exposure, we compute annual and quarterly ESG scores. Quarterly ESG scores are the value-weighted average of the Refinitiv ESG scores of the quarterly stock holdings of hedge fund firms. Stock holdings are from the Thomson Reuters 13F long-only holdings database. Annual ESG scores are quarterly ESG scores averaged over the year. The requirement that stock holdings information is available reduces the hedge fund sample from 11,387 funds to 3,281 funds. Within this group of funds, 2,774 funds hold stocks with valid Refinitiv ESG scores during the sample period.[19] ESG scores are available for a reasonably large number of stocks in the 13F holdings database. For any given quarter, Refinitiv ESG scores are available for 52.26% of hedge fund 13F holdings by market capitalization and for 46.07% of hedge fund 13F holdings by number. Since 13-F holdings data are US-centric, we will also redo our tests with FactSet data which contains international stock holdings information.

[Insert Figure 3 here]

Figure 3 examines the distributions of annual ESG scores for hedge fund signatories and nonsignatories. As one would expect, the average ESG score for signatories at 68.57 exceeds that of nonsignatories at 60.00, respectively. However, the average ESG scores mask significant heterogeneity in firm ESG scores. There is substantial overlap between the distributions of ESG scores for signatories and nonsignatories. On average, each year, a non-trivial 20.79% of signatories have ESG scores that fall below the median ESG score for all firms. This reflects the long left tail of the signatory ESG distribution and suggests that there are a number of signatories that do not walk the talk.

[19] For inclusion in the sample, we require that a fund management company holds in that specific quarter at least one stock with a Refinitiv ESG score. Inferences remain unchanged when we adopt more stringent inclusion criteria and require that the fund management company holds at least five stocks or ten stocks with Refinitiv ESG scores.

Investment firm ESG performance is highly persistent. Firms with below-median ESG scores have a 81.6% chance of exhibiting below-median ESG scores the next year while firms with above-median ESG scores have a 81.4% chance of displaying above-median ESG scores the following year. The persistence suggests that ESG performance is a durable characteristic of investment firms. The stickiness of relative ESG scores applies to signatories as well.

For the average month in our sample period, signatories with below-median ESG exposures manage a non-trivial 17.05% of signatory hedge fund assets. Given the proportion of signatory assets relative to all hedge fund assets at the end of the sample reported in Table 1, i.e., 29.54%, and the HFR estimate of assets managed by the hedge fund industry at the end of 2020, i.e., US$3.6 trillion, the 17.05% estimate implies that a substantial US$181 billion of hedge fund assets are managed by signatories with ESG exposures below that of the median hedge fund firm.

We label as greenwashers signatories with low ESG scores that are in the bottom tercile relative to all other hedge fund management companies.[20] It is worth noting that such signatories have genuinely low ESG scores. Their ESG score in any random year is on average 32.26, which falls in the bottom tercile of the stock universe. In line with the view that these signatories greenwash, the vast majority of such signatories (i.e., 90.48%) include ESG-related words on their websites in spite of their low ESG scores.[21] One concern is that signatories may invest in firms with low current ESG scores and improve their ESG scores via shareholder engagement. However, signatories with low ESG scores are 92.9% likely to have low ESG scores the next year, suggesting that low-ESG signatories do not tend to improve the ESG of their underlying holdings. To verify that low-ESG signatories are indeed greenwashing, in the spirit of Flammer (2015), we estimate probit regressions on

[20] The industries that low-ESG signatories invest in closely track those invested by high-ESG signatories. The difference in value-weighted stock holdings between low- and high-ESG signatories is less than 1% for 125 of the 130 Refinitiv Business Classification industries. Relative to high-ESG signatories, low-ESG signatories allocate more capital to phones and handheld devices (2.30%), personal products (1.11%), and industrial conglomerates (1.07%), and less capital to banks (4.29%) and online services (1.17%). It is worth noting that our baseline results are robust to excluding sector funds from the sample.

[21] The ESG-related words include: child, children, climate, climates, CO_2, emission, emissions, environment, environments, green, impact, recycle, recycling, renewable, steward, stewards, stewardship, sustainability, sustainably, sustainable, welfare, woman, women, social, governance, ESG, responsible, responsibly, socially, environmentally, ethical, ethics, minorities, and minority.

the likelihood that a firm votes on an ESG-related shareholder proposal. Table A1 of the Internet Appendix reveals that firms held by low ESG signatories (as opposed to high-ESG signatories) are less likely to vote on an ESG-related proposal and are *not* more likely to improve their ESG scores. To address any residual concerns, we will redo our baseline tests after reclassifying as greenwashers those signatories with low future ESG scores and after excluding shareholder activists from the sample.

Another concern is that hedge funds can short sell stocks. While data on hedge fund long positions are accessible via Thomson Reuters 13F, data on their short positions are not easily accessible. That said, Fung and Hsieh (2004) show that equity hedge funds tend to have an equity market beta close to 0.5 which implies that they hold more long than short positions. Nonetheless, to sidestep this issue, we will redo our tests after reclassifying signatories with low return exposure to a factor-mimicking stock portfolio for ESG that longs high-ESG stocks and shorts low-ESG stocks as greenwashers.

Panel B of Table 1 reports differences in fund characteristics between signatory and nonsignatory funds, and between low-ESG and high-ESG signatory funds. It indicates that signatory hedge funds charge lower fees, impose shorter redemption notice periods, set higher minimum investments, are older, and manage more capital than do nonsignatory hedge funds. As we shall show, the larger AUM of signatory hedge funds can be traced to their ability to attract greater investor flows. In contrast, low-ESG signatory funds do not differ meaningfully from high-ESG signatory funds except that they tend to charge higher management fees and to be older. In our analysis of fund performance in Section 3.1, we will control for the explanatory power of these fund characteristics in a multivariate regression setting.

3. Empirical results

3.1. Fund performance

To evaluate the performance implications of greenwashing, we first sort hedge funds every month into two equal-weighted portfolios based on whether their fund management compa-

nies were PRI signatories last month. The post-formation returns on these two portfolios over the next month are linked across months to form a single return series for each portfolio. We then evaluate the performance of these portfolios relative to the Fung and Hsieh (2004) seven-factor model and base statistical inferences on White (1980) heteroskedasticity consistent standard errors.

Panel A of Table 2 indicates that hedge funds managed by PRI signatories do not outperform. The spread in raw returns between the portfolio of signatory hedge funds (portfolio A) and the portfolio of nonsignatory hedge funds (portfolio B) is −1.44% per annum (t-statistic = −2.06). After adjusting for covariation with the Fung and Hsieh (2004) seven factors, the spread widens to an economically significant −2.45% per annum (t-statistic = −3.93). The lower risk-adjusted return versus raw return of the spread can be partly attributed to the spread portfolio's positive loading on the equity market factor.

The findings are not driven by smaller hedge funds, which are less relevant for institutional investors. Panel B of Table 2 reveals that when we confine the sample to hedge funds with at least US$20m in AUM, the underperformance of signatory hedge funds is still economically meaningful at 2.24% per year (t-statistic = 3.52). The findings also apply at the fund management company level. Panel C of Table 2 indicates that signatories underperform nonsignatories by 2.97% per year (t-statistic = 3.78) after adjusting for risk. Hedge fund firm returns are the value-weighted returns of the hedge funds operated by each firm.

The results are robust when we split the sample period. The alpha spreads for the first and second halves of the sample period are −2.67% per annum (t-statistic = −2.80) and −1.71% per annum (t-statistic = −2.36), respectively. As Panel A in Table A2 of the Internet Appendix reveals, the results are also robust to value-weighting the portfolios.

[Insert Tables 2 and 3 here]

The underperformance of funds that endorse the PRI could be driven by their greater exposure to socially responsible companies. Pástor, Stambaugh, and Taylor (2020) show that due to investors' preference for green holdings and green assets' ability to hedge climate change risks, green assets feature negative alphas. Alternatively, the underperformance could

be driven by greenwashing and the associated agency problems.

To investigate, every month, we *independently* double sort hedge funds into 2 x 3 portfolios based on PRI endorsement and fund management company ESG scores. In the double sort, hedge funds are grouped into low and high ESG portfolios based on whether their firm ESG scores fall in the bottom or top terciles, respectively. To ensure that there is at least one fund in each of the six portfolios, we sort funds starting in January 2009.[22]

Panel A of Table 3 indicates that the underperformance of signatory hedge funds is not driven by a greater exposure to socially responsible firms. Low-ESG signatory hedge funds underperform low-ESG nonsignatory hedge funds by 7.72% per year (t-statistic = 3.18) after adjusting for risk.[23] Conversely, high-ESG signatory hedge funds only underperform high-ESG nonsignatory hedge funds by a risk-adjusted 0.54% per year (t-statistic = 0.74). Moreover, amongst signatories, relative to those with high ESG exposures, those with low ESG exposures offer hedge funds that underperform by a risk-adjusted 5.94% per year (t-statistic = 3.00). These findings are most consistent with an agency explanation related to greenwashing. One concern is that the substantial underperformance of the low-ESG signatory hedge fund portfolio could be driven by co-variation with fund characteristics, an issue which we tackle in a multivariate regression setting later in this section.

As Panel B of Table 3 reveals, we obtain slightly weaker but qualitatively similar results when we perform a coarser independent double sort whereby we stratify hedge funds into two groups based on the median fund management company ESG score. Signatory hedge funds with below-median ESG exposures underperform nonsignatory hedge funds with below-median ESG exposures by a risk-adjusted 6.02% per year (t-statistic = 2.76).[24]

[22] Prior to January 2009, there were no hedge funds that were managed by signatories with bottom-tercile ESG exposures. Inferences do not change when we restrict the sample to the period, i.e., from August 2009 onwards, when there are at least ten funds in each portfolio.

[23] The statistically significant −0.06 loading on the PTFSBD factor of the spread between the low-ESG signatory and low-ESG nonsignatory hedge fund portfolios suggests that low-ESG signatory hedge funds sold fixed income volatility relative to low-ESG nonsignatory hedge funds during the sample period. Given that the premium on the PTFSBD factor was −2.80% per month during the sample period, the loading on the PTFSBD factor explains −2.02% of the −3.13% difference between the annualized alpha and return of the spread.

[24] To mitigate look-ahead bias, the sort on ESG scores is based on prior year's ESG scores after allowing for a one-year publication lag. For example, the sort on January 2010 is based on investment firm 13F stock holdings at the end of 2009 and stock-level ESG scores from 2008. The one-year publication lag ensures that

Figure 4 illustrates the cumulative abnormal returns of the hedge fund portfolios in Tables 2 and 3. Abnormal return is the difference between a portfolio's excess return and its factor loadings multiplied by the Fung and Hsieh (2004) risk factors, where factor loadings are estimated over the entire sample period. The cumulative abnormal returns indicate that signatories consistently underperform nonsignatories over the sample period and the underperformance is driven by signatories that greenwash.

[Insert Figure 4 and Table 4 here]

Inferences remain qualitatively unchanged when, as part of an analogous independent double sort, we stratify hedge funds based on fund loadings on a factor-mimicking stock portfolio for ESG constructed by going long and short stocks with ESG scores in the top and bottom 30th percentiles, respectively, thereby accounting for hedge fund short positions.

To ensure that our findings are not driven by omitted risk factors, we separately augment the Fung and Hsieh (2004) model with the Carhart (1997) momentum factor (UMD), the Fama and French (2015) profitability and investment factors (RMW and CMA), the Pástor and Stambaugh (2003) liquidity factor (PS), the Frazzini and Pedersen (2014) betting-against-beta factor (BAB), the Bali, Brown, and Caglayan (2014) macroeconomic uncertainty factor (MACRO), the Agarwal and Naik (2004) out-of-the-money call and put option based factors (CALL and PUT), the excess return from the MSCI emerging markets index (EM), and the Buraschi, Kosowski, and Trojani (2014) correlation risk factor (CORR) and reestimate the spread alphas from the Table 2 and 3 portfolio sorts. Table 4 reveals that our results remain robust when we include these factors in the performance evaluation model.

To test whether the findings from the double sort are artifacts of the way we measure ESG exposure, we first decompose the Refinitiv score into the component scores based on E&S factors and on corporate governance factors, and redo the double sort using the component

ESG scores are known prior to firm investment. Panel B in Table A2 of the Internet Appendix indicates that inferences do not change when we do not allow for a one-year publication lag. Panels C and D in Table A2 reveal that inferences also remain unchanged when we sort based on contemporaneous or one-year forward ESG scores, thereby addressing the possibility that some signatories may invest in low ESG stocks with the view towards improving their ESG performance subsequently through, for instance, the passage of CSR-related shareholder proposals (Chen, Dong, and Lin, 2020).

scores. Next, we repeat the same exercise using ESG scores from MSCI and Sustainalytics. Table A3 of the Internet Appendix shows that our conclusions remain unchanged.

To investigate whether our findings are driven by fund characteristics, we estimate the following ordinary least squares multivariate regression:

$$\begin{aligned} ALPHA_{im} = a + bPRI_{im} + cMGTFEE_i + dPERFFEE_i + eNOTICE_i + fMININV_i \\ + g\log(SIZE_{im-1}) + hAGE_{im} + \sum_k p^k STRATDUM_i^k \\ + \sum_l q^l REGIONDUM_i^l + \sum_s r^s YEARMONTHDUM_m^s + \epsilon_{im}, \end{aligned} \tag{1}$$

where *ALPHA* is fund alpha, *PRI* is an indicator variable that takes a value of one when a fund is managed by a PRI signatory, *MGTFEE* is fund management fee in percentage, *PERFFEE* is fund performance fee in percentage, *NOTICE* is fund redemption notification period in months, *MININV* is fund minimum investment in US$ millions, *SIZE* is fund AUM in US$ millions, *AGE* is fund age in decades, *STRATDUM* is the fund investment strategy dummy, *REGIONDUM* is the fund investment region dummy, and *YEARMONTHDUM* is the year-month dummy.[25] Fund alpha is monthly abnormal return from the Fung and Hsieh (2004) model, with the factor loadings estimated over the prior 24 months.[26] We also estimate the analogous regression on raw monthly fund returns and base statistical inferences on robust standard errors that are clustered by fund and month.

The coefficient estimates on *PRI* reported in Columns 1, 2, 4, and 5 of Table 5 indicate that, after adjusting for the various fund characteristics that could explain fund performance, signatory hedge funds underperform nonsignatory hedge funds. To test whether the underperformance of PRI funds relates to greenwashing, we include *ESG_LOW* as well as the interaction between *PRI* and *ESG_LOW* as additional independent variables. *ESG_LOW* is an indicator variable that takes a value of one for hedge funds managed by firms with bottom-tercile ESG scores.[27] Column 6 indicates that low-ESG signatory funds underper-

[25]The investment regions are North America, Asia, Australasia, Emerging Markets, Europe, and Global.

[26]Inferences do not change when we use factor loadings estimated over the past 36 months instead.

[27]For the regressions with *ESG_LOW*, to facilitate comparison between firms in the top and bottom ESG terciles, we drop hedge fund firms with ESG scores in the middle tercile. The results are virtually

form low-ESG nonsignatory funds by a risk-adjusted 2.99% per annum, suggesting that some but not all of the 7.72% per annum underperformance of the low-ESG signatory fund portfolio in Table 3 can be ascribed to co-variation with fund characteristics.[28]

In accordance with the literature, the coefficient estimates on the fund control variables indicate that larger (Berk and Green, 2004), more liquid (Aragon, 2007), and older (Aggarwal and Jorion, 2010) funds underperform.[29] The positive coefficient estimates on *ESG_LOW* are consistent with the Pástor, Stambaugh, and Taylor (2020) conclusion that, given investors' preference for green assets, brown assets should generate greater alphas in equilibrium.

[Insert Tables 5 and 6 here]

To test whether our regression results are robust to adjusting for correlation in residuals across funds within the same month, we estimate Fama and MacBeth (1973) regressions on fund performance and report qualitatively similar results in Columns 7 to 12 of Table 5.

To further verify robustness, we reestimate the OLS and Fama-MacBeth regressions on (i) backfill bias-adjusted alphas, (ii) incubation bias-adjusted alphas, (iii) unsmoothed alphas, (iv) alphas from prefee fund returns, and (v) alphas after excluding activists. To adjust for backfill bias, we remove all returns reported prior to fund listing date. If fund listing date is not available, we estimate fund listing date using the algorithm of Jorion and Schwarz (2019). To adjust for incubation bias, we remove the first 24 months of returns for each fund. To generate unsmoothed alphas, we unsmooth fund returns using the algorithm of Getmansky, Lo, and Makarov (2004). To generate alphas from prefee fund returns, we calculate high water mark and performance fee by matching each capital outflow to the relevant capital

unchanged when we do not exclude hedge fund firms with middle-tercile ESG scores. In those regressions, we include *ESG_MIDDLE* as well as the interaction between *PRI* and *ESG_MIDDLE* as additional independent variables, where *ESG_MIDDLE* is an indicator variable that takes a value of one for hedge funds managed by firms with middle-tercile ESG scores.

[28] The inferred alpha difference between low-ESG signatory and low-ESG nonsignatory funds, i.e., −2.99% per annum, is simply 12 times the sum of the coefficient estimate on *PRI* and that on the interaction between *PRI* and *ESG_LOW*, i.e., $12 \times (0.040 - 0.289)$. The aforementioned sum of the betas is statistically distinguishable from zero at the 1% level with an F-statistic of 5.04.

[29] To cater to readers who may wonder whether greenwashing has incremental explanatory power on fund performance over and above that of past performance (Jagannathan, Malakhov, and Novikov, 2010), we reestimate the regressions after controlling for past one-year and two-year fund alpha. As shown in Table A4 in the Internet Appendix, our results are robust to this adjustment.

inflow and assuming as per Agarwal, Daniel, and Naik (2009) that capital leaves the fund on a first-in, first-out basis. To exclude activists (Dimson, Karakaş, and Li, 2020), we check 13D filings. We identify 432 activist hedge fund managers, of which 42 are signatories and 21 report returns after endorsing PRI. Table 6 reveals that our regression results are robust to these adjustments. In results available upon request, we show that inferences do not change when we include fixed effects in the regressions for the countries where hedge funds are based, as opposed to where they invest in.

3.2. Incentive alignment

To test whether the underperformance of funds that greenwash relates to agency problems, we first sort funds into two groups based on metrics that capture incentive alignment between fund management and investors. These metrics include manager total delta (Agarwal, Daniel, and Naik, 2009), the ratio of fund management fee to performance fee (Fung et al., 2020), and fund governance score (Ozik and Sadka, 2015).

For the sorts on manager total delta and the ratio of management fee to performance fee, we partition funds based on the median value of the respective incentive alignment metric. Funds with zero performance fees are assigned to the high management fee to performance fee group. The Ozik and Sadka (2015) governance score is based on whether a fund is an onshore fund, features a high-water mark, is SEC registered, has been audited in the past, and employs a top auditor or legal counsel. Since the governance score takes values from zero to five, we classify as low scores those less than or equal to two and as high scores those greater than or equal to three.

Funds with low manager total deltas, high management fees relative to performance fees, and low governance scores should be more susceptible to agency problems. For example, Agarwal, Daniel, and Naik (2009) show that funds that are operating far below their high-water marks, and therefore exhibit low manager total deltas, have incentives that are less aligned with those of their investors. Consequently, under the agency view, we expect signatory underperformance, as well as the underperformance of low-ESG signatories, to be greater for such funds. Therefore, for each group of funds partitioned by incentive alignment,

we redo the baseline sort on PRI endorsement and the double sort on PRI endorsement and investment firm ESG scores.

Table 7 supports the agency view. It indicates that our baseline sort results are stronger for funds whose incentives are less aligned with their investors. Moreover, we find that the risk-adjusted fund underperformance of low-ESG signatories, relative to low-ESG nonsignatories, is also larger for funds with poorer incentive alignment. Specifically, for low-manager total delta, high-management fee to performance fee, and low-governance score funds, the risk-adjusted underperformance of low-ESG signatory funds is 6.95%, 9.81%, and 9.28% per annum, respectively. Conversely, for high-manager total delta, low-management fee to performance fee, and high-governance score funds, the risk-adjusted underperformance of low-ESG signatory funds is only 4.69%, 5.97%, and 5.14% per annum, respectively.[30]

[Insert Table 7 here]

3.3. Operational risk

To further investigate the agency view, we test whether greenwashing provides insight into other aspects of managerial opportunism. If greenwashing is driven by agency problems, we expect that such problems will manifest as greater operational risk. Specifically, we conjecture that greenwashers will deviate from expected standards of business conduct or cut corners when it comes to compliance, precipitating regulatory action or lawsuits, which have to be reported on Item 11 of the Form ADV file (Brown et al., 2008; 2009; 2012). Moreover, greenwashers should exhibit some of the suspicious patterns in reported returns that Bollen and Pool (2009; 2012) show are leading indicators of fraud.

To investigate, we estimate probit regressions on the probability that hedge fund firms report fresh violations on their Form ADVs each year. The probit regressions feature the independent variables used in Eq. (1) as well as *ESG_LOW* and the interaction of *ESG_LOW*

[30] In results that are available upon request, we find that the explanatory power of the interaction between *PRI* and *ESG_LOW*, i.e., our proxy for greenwashing, in the performance regressions in Table 5 survives the inclusion of these fund incentive alignment metrics, suggesting that greenwashing provides incremental explanatory power on hedge fund performance relative to more traditional measures of fund agency problems.

with *PRI*. The probit regressions include as dependent variables the following four indicator variables: *VIOLATION*, *REGULATORY*, *INVESTMENT*, and *SEVERE* that takes values of one when a firm reports any violation, a regulatory violation, an investment violation, and a severe violation, respectively.[31] We leverage on Form ADV Disclosure Reporting Pages, which must accompany any affirmative response to Item 11, to determine the first and last date for each violation. For each fund-year observation, the violation variables take a value of one if and only if the year overlaps with the date range for the specific violation. The coefficient estimates on the interaction variables reported in Columns 1 to 4 of Table 8 reveal that, relative to signatories with high ESG scores, those with low ESG scores experience more regulatory actions, trigger more investment violations, and report more severe infractions. The marginal effect reported in Column 1 suggests that low-ESG signatories have a 8.6% greater probability of reporting a violation in any given year than do high-ESG signatories, which is economically meaningful given that the unconditional probability that a fund reports a violation in any given year is 3.8%.

[Insert Table 8 here]

We also estimate analogous probit regressions on the probability that hedge fund firms trigger the four performance flags that are most often linked to funds with reporting violations as per Panel B of Table 5 in Bollen and Pool (2012): Kink, %Negative, Maxrsq, and %Repeat. Kink is triggered by a discontinuity at zero in the hedge fund return distribution. %Negative is triggered by a low number of negative returns. Maxrsq is triggered by an adjusted R^2 that is not significantly different from zero. %Repeat is triggered by a high number of repeated returns. The probit regressions include as dependent variables the following four indicator variables that correspond to the aforementioned performance flags: *KINK*, *%NEGATIVE*, *MAXRSQ*, and *%REPEAT*. Each indicator variable takes a value of one when the corresponding flag is triggered by at least one fund managed by the firm over each non-overlapping 24-month period post inception. The coefficient estimates on the in-

[31] Regulatory violations refer to Form ADV Items 11.C.1–11.C.5, 11.D.1–11.D.5, 11.E.1–11.E.4, 11.F., and 11.G. Investment violations refer to Form ADV Items 11.B.1., 11.C.3, 11.C.4, 11.D.2, 11.D.3, 11.D.4, 11.D.5, 11.E.3, 11.H.1a, 11.H.1b, and 11.H.1c. Severe violations refer to Form ADV Items 11.A.1, 11.A.2, 11.C.4, 11.C.5, 11.D.4, and 11.D.5.

teraction variables reported in Columns 5 to 8 of Table 8 indicate that relative to signatories with high ESG scores, those with low ESG scores are more likely to set off three of the four performance flags considered, namely, Kink, %Negative, and %Repeat.

3.4. Endogeneity

One concern is that unobserved factors *unrelated to agency* that affect both greenwashing and fund performance could drive our findings. For example, unskilled hedge fund firms may endorse PRI to compensate for their inability to outperform and unintentionally botch ESG implementation. To address such endogeneity concerns, we exploit the staggered adoption of stewardship codes in the countries where the hedge fund firms are based.

Stewardship codes, either mandated by regulators or proposed by industry associations, seek to promote higher levels of investor engagement by encouraging the development and public disclosure of policies on how investor stewardship responsibilities are discharged. These include investor obligations in a number of key governance areas, most commonly: conflicts of interests, voting, monitoring and engaging with the investee company, and the consideration of ESG factors. In addition, stewardship codes often encourage investors to disclose their policies prominently, typically on the investor's web site and/or within an annual report, and to provide annual updates. We argue that stewardship codes, by addressing conflicts of interests and encouraging transparency, help mitigate agency problems and reduce greenwashing among asset managers. Figure A1 of the Internet Appendix provides, as an example, the stewardship code adopted by the UK on July 2010.[32]

To test whether the adoption of stewardship codes reduces the tendency of asset managers to indulge in greenwashing, we estimate regressions on the proportionate change in fund quarterly ESG exposure with *PRI*, *STEWARDSHIP*, and their interaction as the independent variables of interest. *STEWARDSHIP* is an indicator variable that takes a value

[32]During our sample period, ten countries/regions from which the hedge funds in the sample are based adopted stewardship codes. These countries/regions include Australia, Brazil, Germany, Hong Kong SAR, Ireland, Norway, Singapore, Switzerland, the UK, and the US. For countries that revised their stewardship codes or adopted different stewardship codes over time, e.g., the UK, we focus on the date on which the first set of stewardship codes was adopted by the country.

of one during the three months that follow the adoption of stewardship codes in the country where the hedge fund firm is based. The regressions also control for the other fund variables featured in Eq. (1). Column 1 of Table 9 reveals that low-ESG signatory funds increase ESG exposure in the three-month period following stewardship code adoption by 39.2%. In contrast, Column 4 of Table 9 shows that high-ESG signatory funds increase ESG exposure following stewardship code adoption by a modest 2.9%, which dovetails with the intuition that for them the pressure to improve ESG performance is lower given their higher initial ESG scores.

[Insert Table 9 here]

If greenwashing drives the underperformance of low-ESG signatory hedge funds, we should observe that the adoption of stewardship codes ameliorates the underperformance of such funds. This is indeed what we find. Columns 2 and 3 of Table 9 reveal that for low-ESG funds, the coefficient estimates on the interaction between *PRI* and *STEWARDSHIP* are positive and statistically significant at the 5% or 1% level in the regressions on fund return and alpha. Columns 5 and 6 indicate that for high-ESG funds, we do not observe a similar result. These findings are difficult to reconcile with an explanation based on manager skill since it is not clear why skill would improve for low-ESG signatory managers immediately following the adoption of stewardship codes in the country.[33]

The results are not simply the by-product of the increase in ESG exposures post stewardship code adoption directly affecting the returns of low-ESG signatories. Pástor, Stambaugh, and Taylor (2020) show that, in equilibrium, green assets should generate lower alphas than brown assets owing to the greater investor demand for and climate change hedging benefits of green securities. Moreover, Table 5 reveals that funds with low ESG exposures, in general, tend to deliver higher alphas. If anything, the increase in ESG exposures should worsen the underperformance of low-ESG signatories.

For added comfort, we conduct a placebo test that evaluates changes in ESG exposures and fund performance for the three-month period that starts six months prior to the adop-

[33] In results that are available upon request, we show that inferences remain unchanged when we study the behavior of low- and high-ESG signatories in the 12-month period post stewardship code adoption.

tion of the stewardship codes. We skip the three-month period immediately prior to the stewardship code adoption month to avoid the confounding effects of possible information leakages prior to stewardship code announcement. Table A5 of the Internet Appendix reveals that, as expected, there is no evidence to suggest that low-ESG funds increase their ESG exposures or improve their performance during that period.

To further address endogeneity concerns, we leverage on the revisions made to the U.S. Federal Trade Commission (henceforth FTC) Green Guides on October 2012. The revised Green Guides are designed to help marketers ensure that the claims that they make about the environmental attributes of their products are truthful and non-deceptive. The Green Guides describe the types of environmental claims that FTC may or may not find deceptive under Section 5 of the FTC Act. Under Section 5, the FTC can take enforcement action against deceptive claims.[34] While the Green Guides focus on the erroneous marketing claims of physical products, one could reasonably infer that the revisions signal the FTC's intent to ratchet up enforcement pressure on greenwashing in general. Therefore, the revisions should curb greenwashing for funds. Moreover, by aligning fund manager incentives with those of responsible fund investors, via the threat of enforcement actions by the FTC, we argue that the revisions should also at least temporarily mitigate agency problems.

Next, we estimate a second set of regressions with *FTCGREENGUIDE* in place of *STEWARDSHIP*, where *FTCGREENGUIDE* takes a value of one during the three months that follow the FTC Green Guides revisions on October 2012. Since the FTC Green Guides apply to products marketed in the US, we focus the analysis on hedge funds based in the US or investing in the US (including funds that invest globally). Note that since *FTCGREENGUIDE* is spanned by three of the year-month dummies, we only include the interaction of *FTCGREENGUIDE* and *PRI* in these regressions. Columns 7 and 10 of Table 9 indicate that consistent with the view that the revisions curb greenwashing, unlike high-ESG signatories, low-ESG signatories increase their ESG exposure in the three-month period following the revisions. Moreover, Columns 8, 9, 11, and 12 reveal that, relative to high-ESG signatories, low-ESG signatories improve their performance in the immediate wake of the

[34]For more information on the revised Green Guides, see https://www.ftc.gov/news-events/press-releases/2012/10/ftc-issues-revised-green-guides.

FTC Green Guides revisions. These results further bolster the view that our findings are not driven by omitted variables unrelated to agency that correlate with both greenwashing and fund performance.

3.5. Investor flows

Do investors discriminate between greenwashers and genuinely green funds? According to Cowell and Rajan (2020, p. 30), "*institutional investors are getting more savvy in how they approach ESG in their due diligence, duly separating the leaders from the pretenders and the winners from the spinners.*" To test, we study the effects of greenwashing on fund flow.

To understand the effects on fund flow, we estimate multivariate OLS regressions on annual hedge fund flow ($FLOW$) with PRI and the interaction of PRI and ESG_LOW as the independent variables of interest. We include, as control variables, the set of fund characteristics from the Eq. (1) regression, the standard deviation of fund returns estimated over the last 12 months ($RETSTD$), as well as year, investment strategy, and investment region fixed effects. Following Agarwal, Green, and Ren (2018), we also control for past 12-month fund return rank ($RANK$), CAPM alpha rank ($RANK\_CAPM$), and Fung and Hsieh (2004) alpha rank ($RANK\_FH$). Finally, we estimate analogous regressions on annual hedge fund firm flow ($FIRM\_FLOW$) since any benefits from PRI endorsement are even more likely to accrue at the firm level. For example, signatories could take advantage of the potential marketing uplift from endorsing responsible investment to launch more funds.

Table 10 reveals that signatory hedge funds attract greater investor flows after controlling for past fund performance and a variety of fund characteristics. The coefficient estimate on $FLOW$ in the regression with $RANK$ indicates that PRI endorsement is associated with a 10.60% increase in annual hedge fund flow. Column 7 reveals that PRI endorsement is associated with an even larger 19.70% increase in annual hedge fund firm flow.

[Insert Table 10 here]

Table 10 further reveals that fund flows to low-ESG signatories do not differ meaningfully

from flows to high-ESG signatories after controlling for past fund performance and other usual suspects. The coefficient estimates on the interaction between *PRI* and *ESG_LOW* reported in Columns 4 to 6 are statistically indistinguishable from zero at the 10% level. Columns 10 to 12 reveal similar results for firm level flows. In results that are available upon request, we find that inferences remain qualitatively unchanged when we control for past year fund flows or firm flows in the regressions. Moreover, we find no evidence that the sensitivity of flows to past performance differs between greenwashers and genuinely green funds. These findings suggest that it is premature to conclude that institutional investors, who are responsible for most of the capital managed by hedge funds, accurately assess ESG exposure in the due diligence process.

3.6. Equilibrium implications

Why do low-ESG signatories thrive despite not walking the talk, underperforming other signatories, and exhibiting greater operational risk? We believe there are several reasons why greenwashing can persist. First, we find considerable disagreement between ESG data providers. Signatories categorized based on Refinitiv data as low-ESG are only 47.46% and 35.44% likely to be classified as low-ESG based on MSCI and Sustainalytics data, respectively. This is unsurprising given the inherent subjectivity of ESG assessments and implies that low-ESG signatories are unlikely to face significant litigation risk.

Second, low-ESG signatories only differ marginally from high-ESG signatories along more salient and transparent dimensions. For example, the sin stock ownership (Hong and Kacperczyk, 2009) of low-ESG signatories only exceeds that of high-ESG signatories by 1.2 percentage points. Although the difference in sin stocks as a proportion of firm AUM is statistically meaningful at the 5% level, it is economically modest. Therefore, without appealing to data from ESG providers it would be difficult for asset owners to assess signatory ESG exposures.

Third, low-ESG signatories promote their hedge funds more aggressively. Low-ESG and high-ESG signatories report hedge fund returns to on average 1.46 and 1.26 databases, respectively. Moreover, the percentage of low-ESG and high-ESG signatories with duplicate share classes is 49.06% and 42.97%, respectively. The difference in the number of databases

and the difference in the proportion of funds with duplicate share classes are statistically significant at the 1% level. By reporting to more databases and offering duplicate share classes, low-ESG signatories effectively lower investor search and entry costs.

Fourth, low-ESG signatories tend to attract less sophisticated investors than do high-ESG signatories. Using information from Item 5D of the Form ADV, we find that for the average year, 8.92% of the AUM of low-ESG signatories can be attributed to high-net worth individuals (henceforth HNWIs). For high-ESG signatories, only 4.08% of AUM can be attributed to HNWIs. The difference is statistically significant at the 5% level. Relatively unsophisticated investors such as HNWIs (as opposed to institutional investors) are less likely to have the financial wherewithal to accurately assess ESG exposure.

3.7. Robustness tests

We conduct a battery of robustness tests to ascertain the strength of our baseline portfolio sort results. We redo the baseline portfolio sorts after adjusting for backfill bias, incubation bias, serial correlation in fund returns, and fund fees, and after excluding activists. These adjustments are conducted as per the analysis for Table 6.

To cater for additional omitted risk factors, we separately augment the Fung and Hsieh (2004) model with the returns from factor-mimicking stock portfolios for ESG, CO_2 emissions, and toxic emissions. The ESG factor is constructed by going long and short stocks with ESG scores in the top and bottom 30th percentiles, respectively. The CO_2 and toxic emissions factors are similarly constructed. CO_2 emissions are based on Trucost data on direct emissions from production (scope 1) as per Bolton and Kacperczyk (2021). Toxic emissions are based on Toxic Release Inventory pollution data maintained by the Environmental Pollution Agency as per Hsu, Li, and Tsou (2020).

To ameliorate concerns that the risk loadings of hedge fund portfolios may vary over time, we estimate factor loadings dynamically over a rolling 24-month window and reassess the alphas from the portfolio sorts.

To cater for the possibility that low-ESG signatories could be more distracted by the

additional reporting requirements that come with PRI endorsement, we split our sample into large and small investment firms. The effects of limited attention should be confined to small investment firms since large investment firms can easily accommodate the additional reporting requirements.

To cater to concerns that our signatory sample does not include delisted signatories, we obtain the list of former signatories from PRI annual reports. We match them to 41 of the fund management firms in our sample. According to the PRI, 14 firms were delisted due to merger with or acquisition by another signatory. The other 27 firms either did not pay the mandatory annual membership fee, did not participate in the annual reporting and assessment process, or chose to voluntarily leave the PRI. The PRI does not typically report signing and delisting dates for former signatories. For firms that appear on the new signatory lists in annual reports, we assume that they endorsed the PRI in the middle of the reporting period spanned by the relevant annual report. Otherwise, we assume that they joined at founding, i.e., on 27 April 2006. For firms that appear on the delisted signatory lists in annual reports, we assume that they delisted in the middle of the reporting period associated with the relevant annual report.

To maximize coverage, our sample includes investment firms that also offer non-hedge fund products. Nonetheless, we redo our baseline sorts on pure play hedge fund firms, for which hedge funds is a dominant business. To identify pure play firms, we follow the algorithm of Brunnermeier and Nagel (2004). Of the 307 signatories in our sample, 279 are pure play hedge fund firms.

To ameliorate concerns that our stock holdings data is US-centric, we merge stock holdings data from Thomson Reuters 13F and FactSet, and recompute firm ESG exposure. While FactSet contains international stock holdings information, a disadvantage is that, for some countries, its international stock holdings data may be derived exclusively from mutual fund filings. Table 11 indicates that inferences remain unchanged after these adjustments.

[Insert Table 11 here]

Panels E to I of Table A2 of the Internet Appendix reveal that the baseline results are also

robust to (i) adjusting returns for fund termination, (ii) excluding PRI founding signatories, (iii) analyzing style-adjusted fund performance, (iv) confining the analysis to equity-centric hedge funds, and (v) excluding sector hedge funds.

3.8. Mutual funds

To evaluate external validity, we study actively managed US equity mutual funds from the CRSP US Mutual Fund database. In our sample period, we have 4,495 mutual funds of which 2,713 are live and 1,782 are dead funds. Since mutual funds feature higher levels of transparency, disclosure, and regulatory oversight relative to hedge funds, thereby limiting agency problems and constraining opportunistic behavior, we expect to find weaker results for mutual funds. Nonetheless, if agency problems drive the underperformance of greenwashers, we should obtain qualitatively similar results for mutual funds with *weak incentive alignment*.

To test, we first sort mutual funds into two groups based on the median values of metrics that capture incentive alignment between fund management and investors. Prior work argues that mutual funds with high expense ratios (Gil-Bazo and Ruiz-Verdú, 2009), managed by listed fund management companies (Ferris and Yan, 2009), and that rarely vote on the shareholder proposals of their portfolio companies (Bebchuk, Cohen, and Hirst, 2017) are more prone to agency problems. Therefore, our incentive alignment metrics include fund expense ratio, fund management company listing status, and fund shareholder proposal voting frequency.[35] To determine shareholder proposal voting frequency, we employ fund-level shareholder proposal voting data from Institutional Shareholder Services, which are available for mutual funds but not for hedge funds. Next, for each group of funds partitioned by incentive alignment, we redo the sort on PRI endorsement and the double sort on PRI endorsement and ESG scores.

Table 12 indicates that our baseline sort results also apply to mutual funds, albeit for those with poor incentive alignment. Specifically, the risk-adjusted underperformance of low-ESG signatories, relative to low-ESG nonsignatories, ranges from 1.47% to 1.95% per annum and is statistically significant at the 5% level for mutual funds with poor incentive alignment

[35] We obtain similar results when sorting *hedge funds* based on fund management company listing.

but is statistically indistinguishable from zero for those with strong incentive alignment. These results corroborate the view that agency problems drive the underperformance of mutual funds that greenwash.

[Insert Table 12 here]

4. Conclusion

Despite the unprecedented demand for responsible investment, the concerns raised by practitioners and regulators about greenwashing, and the potential for greenwashing to undermine sustainable finance, we know little about greenwashing in finance. This paper sheds light on greenwashing by analyzing hedge funds that publicly endorse responsible investment but exhibit low ESG exposures. An integral part of the portfolios of responsible institutional investors, hedge funds are particularly susceptible to greenwashing given the skepticism expressed by hedge fund managers about the importance of ESG.

We establish five main results. First, hedge funds that greenwash underperform both genuinely green and nongreen funds after adjusting for risk. The underperformance of hedge funds that indulge in greenwashing explains the inferior performance of hedge funds that endorse responsible investment.

Second, consistent with the agency view, the underperformance of hedge funds that greenwash is stronger among funds for whom the incentives of fund managers and investors are misaligned. Moreover, in line with the agency story, greenwashers are more likely to trigger regulatory, investment, and severe violations. They are also more likely to display suspicious patterns in reported fund returns that are potential indicators of fraud.

Third, agency problems causally relate to greenwashing and fund underperformance. In the immediate aftermath of the adoption of stewardship codes, which mitigate agency problems by encouraging fund transparency and tempering conflicts of interests, both the ESG exposure and relative performance of funds that hitherto engaged in greenwashing improve. Similarly, in the wake of the revisions to the US FTC Green Guides, which align

signatory incentives with those of responsible investors via the threat of FTC enforcement, low-ESG US signatories improve ESG exposure and fund performance.

Fourth, hedge funds that greenwash reap tangible and pecuniary benefits. After controlling for the usual suspects, funds that endorse responsible investment attract substantially larger inflows than do other funds. Investors do not on average discriminate between greenwashers and genuinely green funds. Greenwashers attract less sophisticated investors such as high-net worth individuals who are less able to accurately assess ESG exposure.

Fifth, in an out-of-sample test, we study actively managed mutual funds. Given their higher levels of transparency, disclosure, and regulatory oversight, which curb agency problems, we expect to find weaker results for mutual funds. Nonetheless, for mutual funds with poor incentive alignment, we still find that those managed by low-ESG signatories underperform those managed by low-ESG nonsignatories, suggesting that agency problems drive greenwashing and fund underperformance for mutual funds as well.

Collectively, these results shed light on the investment performance, operational risk, and asset gathering implications of greenwashing. Given the inherent subjectivity and substantial information acquisition costs associated with ESG assessment as well as the heterogeneity in sophistication levels among hedge fund investors, greenwashing is likely to persist. Nevertheless, responsible asset owners can take comfort in the fact that regulatory and societal pressures, e.g., via the adoption of stewardship codes, can help fund managers internalize their investors' preference for responsible investment.

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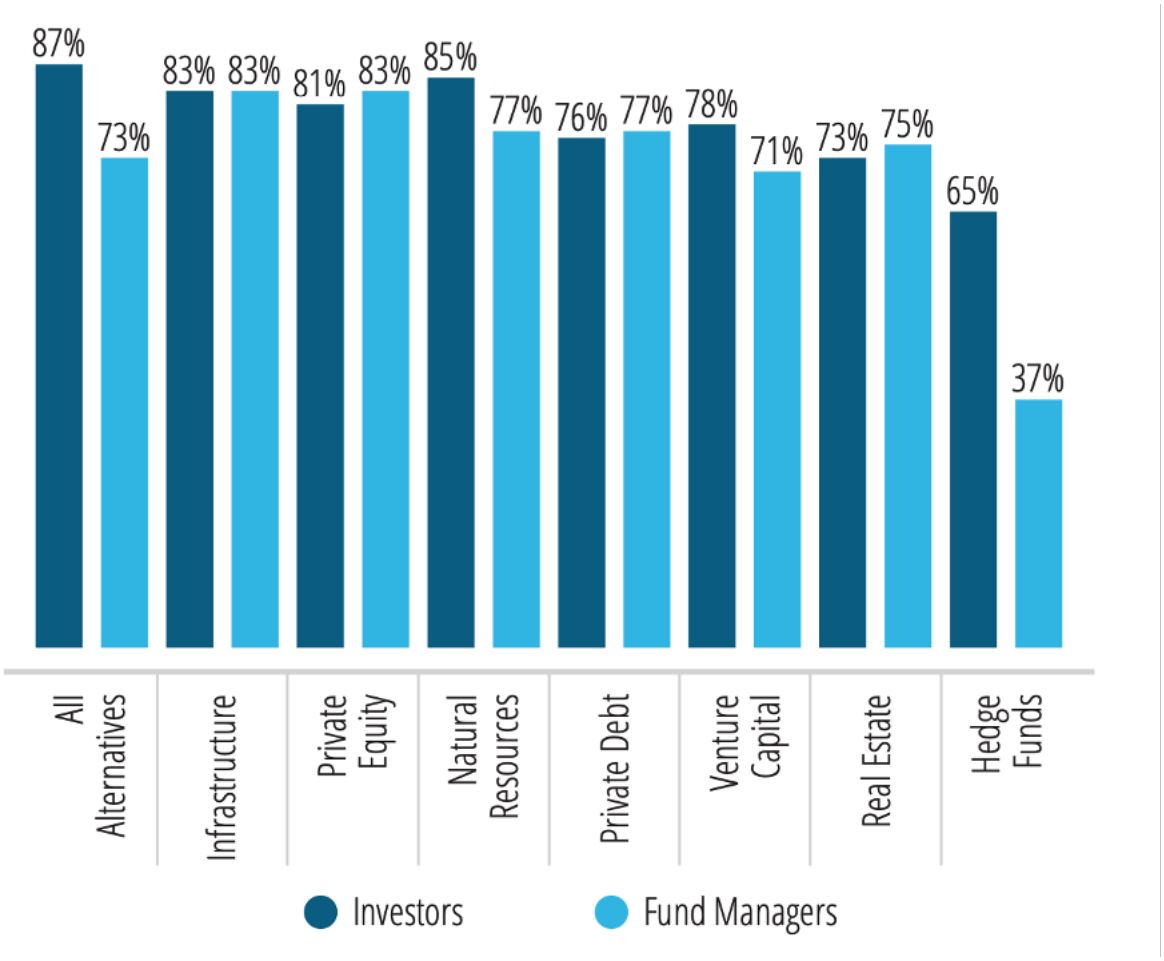

Figure 1: Investors and fund managers that believe ESG will become more important over the next five years. Source: Preqin Investor and Fund Manager Surveys, June 2018. Reproduced from page 62 of https://docs.preqin.com/reports/Preqin-Future-of-Alternatives-Report-October-2018.pdf.

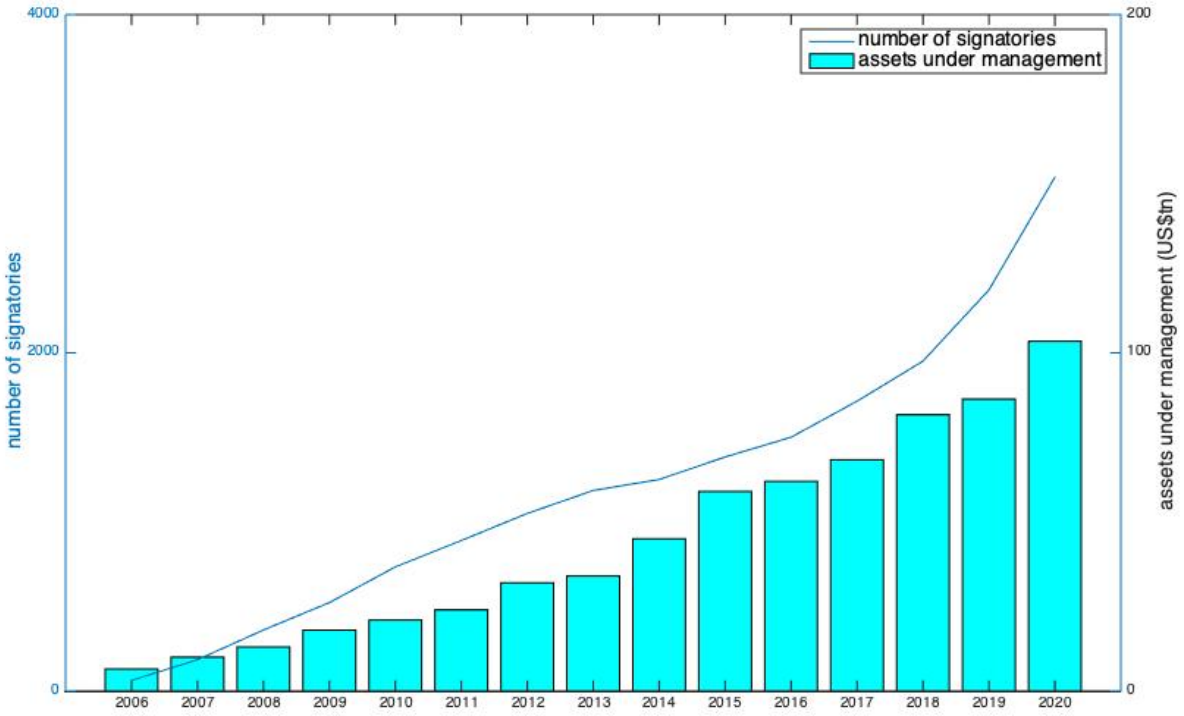

Figure 2: PRI signatory growth. PRI denotes the United Nations Principles for Responsible Investment. PRI signatories include asset owners, investment managers, and service providers. The line graph depicts the number of PRI signatories (y-axis on the left). The bar graph depicts the assets under management of PRI signatories in trillions of US dollars (y-axis on the right). The PRI was launched on 27 April 2006.

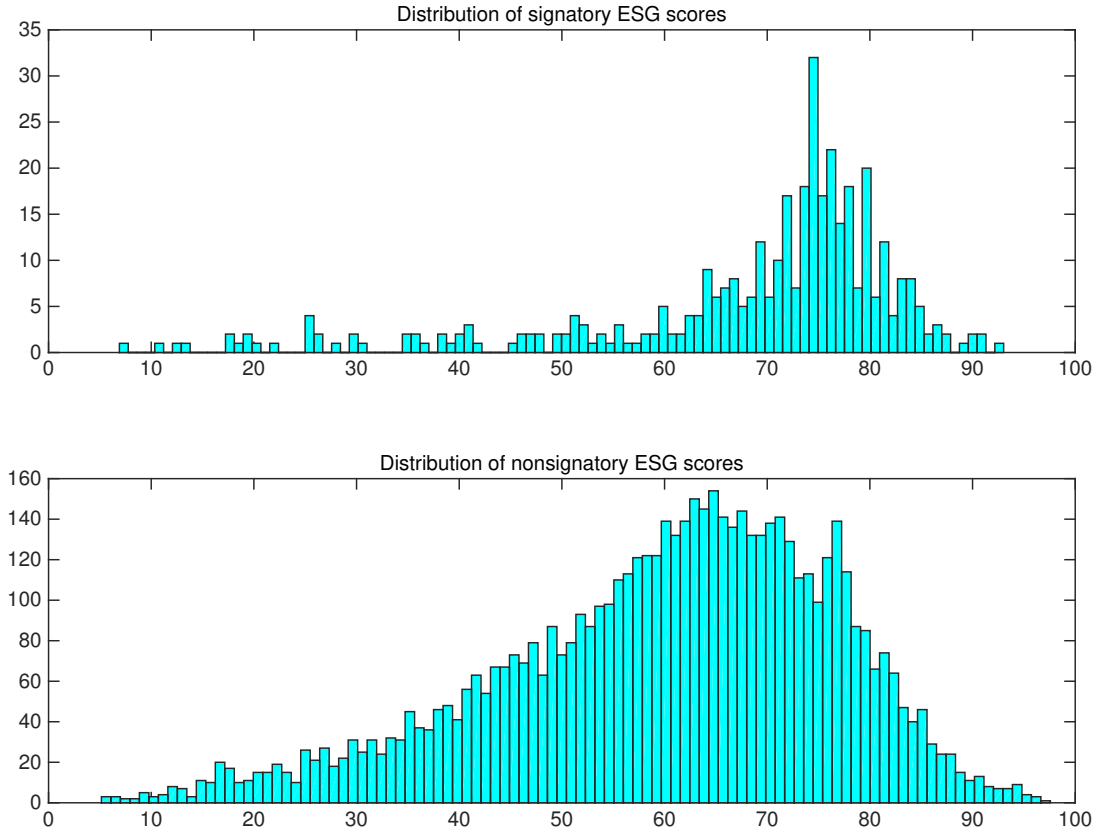

Figure 3: Firm ESG scores for PRI signatories and nonsignatories. PRI denotes the United Nations Principles for Responsible Investment. Firm ESG scores are the value-weighted average of the Refinitiv ESG scores of the stocks held by hedge fund firms computed quarterly and averaged over the year. The sample period is from May 2006 to April 2019.

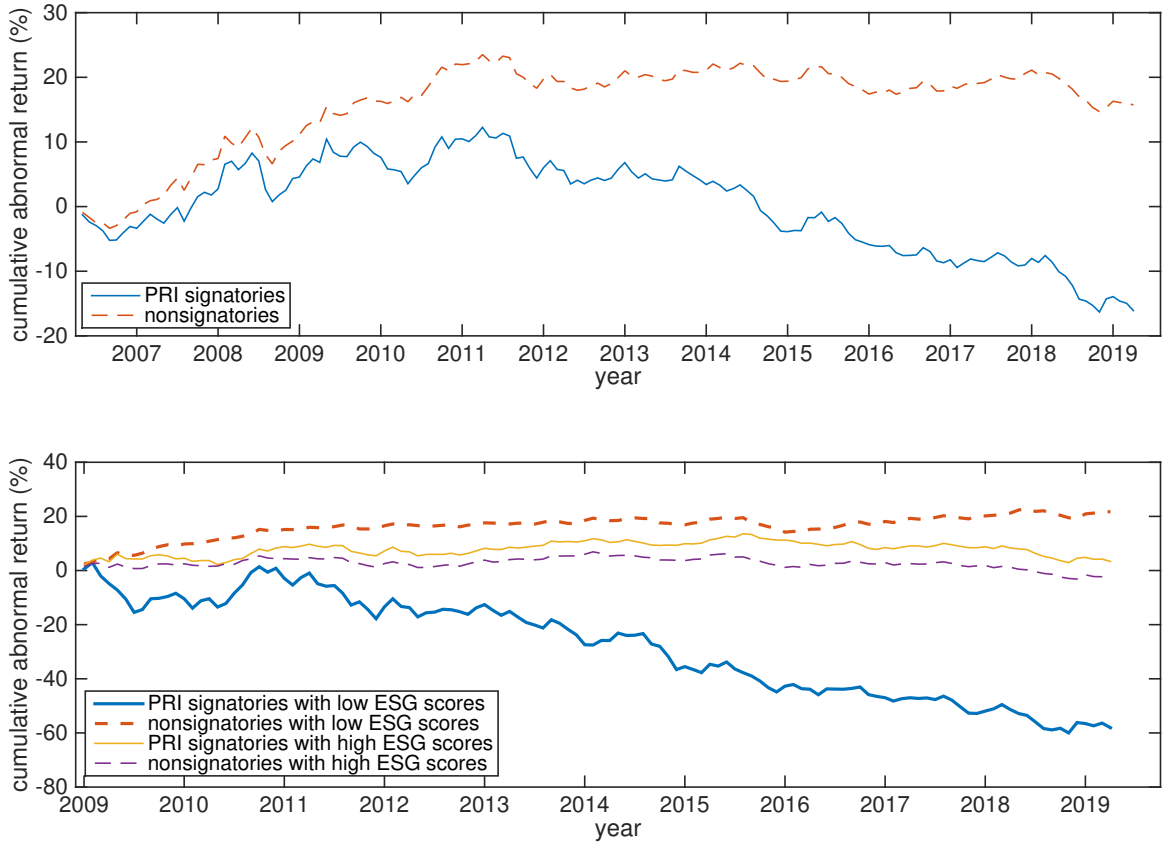

Figure 4: Cumulative abnormal returns of hedge funds sorted on PRI endorsement and firm ESG scores. Every month, hedge funds are sorted into two portfolios based on PRI endorsement (top graph) or sorted independently into 2 x 3 portfolios based on PRI endorsement and firm ESG scores (bottom graph). The solid lines denote portfolios of hedge funds managed by PRI signatories. The dashed lines denote portfolios of hedge funds managed by nonsignatories. In the bottom graph, the thick and thin lines denote portfolios of hedge funds managed by fund management companies with bottom-tercile and top-tercile ESG scores, respectively. PRI denotes the United Nations Principles for Responsible Investment. Firm ESG scores are the value-weighted average of the Refinitiv ESG scores of the stocks held by hedge fund firms. Abnormal return is the difference between a portfolio's excess return and its factor loadings multiplied by the Fung and Hsieh (2004) risk factors, where factor loadings are estimated over the entire sample period. The sample period is from May 2006 to April 2019. To ensure that there is at least one hedge fund in each of the sub-portfolios for the independent double sort, the double sort is conducted only starting in January 2009.

Table 1: **Summary statistics**
Panel A reports the number of hedge funds, the number of hedge fund firms or fund management companies, and the total hedge fund assets under management (AUM) for PRI signatory and nonsignatory firms at the end of each year. PRI denotes the Principles for Responsible Investment. Panel B reports fund characteristics for PRI signatory and nonsignatory firms and for low- and high-ESG signatory firms. Low- and high-ESG signatories are those with bottom and top tercile ESG scores, respectively. Firm ESG scores are the value-weighted average of the Refinitiv ESG scores of the stocks held by hedge fund firms. The sample period is from May 2006 to April 2019. *, ** denote significance at the 5% and 1% levels, respectively.

Panel A: Funds and fund management companies by year

Year	PRI signatories			nonsignatories		
	Number of fund management companies	Number of hedge funds	Total AUM (US$m)	Number of fund management companies	Number of hedge funds	Total AUM (US$m)
2006	16	90	$26,232	2,783	4,971	$943,176
2007	23	111	$33,117	2,777	5,018	$1,178,579
2008	34	154	$41,729	2,679	4,643	$774,208
2009	44	197	$57,067	2,659	4,492	$759,299
2010	55	216	$60,115	2,570	4,364	$861,206
2011	65	225	$71,313	2,506	4,250	$854,672
2012	77	270	$148,418	2,406	3,996	$832,033
2013	84	314	$196,056	2,359	3,893	$951,770
2014	93	330	$226,707	2,241	3,733	$974,013
2015	103	386	$268,944	2,040	3,334	$939,121
2016	119	418	$269,917	1,906	3,111	$883,879
2017	146	489	$354,631	1,762	2,867	$896,911
2018	171	498	$316,275	1,531	2,430	$774,724
2019 (April)	174	489	$315,603	1,429	2,235	$752,962

Panel B: Fund characteristics

Fund characteristics	PRI signatories	nonsignatories	spread	Low-ESG signatories	High-ESG signatories	spread
Management fee (%)	1.25	1.50	-0.25**	1.34	1.16	0.18**
Performance fee (%)	14.12	17.75	-3.64**	14.54	13.94	0.60
Notice period (months)	1.08	1.74	-0.66**	1.17	1.22	-0.05
Minimum investment (US$m)	1.67	1.21	0.46*	1.83	1.63	0.20
Age (decades)	0.62	0.49	0.13**	0.84	0.62	0.21*
AUM (US$m)	452.31	157.16	295.15**	691.58	649.84	41.74

Table 2: **Portfolio sorts on PRI endorsement**

Every month, hedge funds are sorted into two portfolios based on whether they are managed by PRI signatory or nonsignatory firms. Portfolios A and B are equal-weighted portfolios of hedge funds managed by PRI signatory and nonsignatory firms, respectively. PRI denotes the United Nations Principles for Responsible Investment. Performance is estimated relative to the Fung and Hsieh (2004) factors, which are the S&P 500 return minus risk-free rate (SNPMRF), Russell 2000 return minus S&P 500 return (SCMLC), change in the constant maturity yield of the US ten-year Treasury bond appropriately adjusted for the duration of the ten-year bond (BD10RET), change in the spread of Moody's BAA bond over ten-year Treasury bond appropriately adjusted for duration (BAAMTSY), bond PTFS (PTFSBD), currency PTFS (PTFSFX), and commodities PTFS (PTFSCOM), where PTFS is primitive trend following strategy. In Panel A, we report results for hedge funds. In Panel B, we report results for hedge funds with assets under management (AUM) greater than US$20 million. In Panel C, we report results for hedge fund firms. The t-statistics, derived from White (1980) standard errors, are in parentheses. The sample period is from May 2006 to April 2019. *, ** denote significance at the 5% and 1% levels, respectively.

Hedge fund portfolio	Excess return (percent/year)	Alpha (percent/year)	SNPMRF	SCMLC	BD10RET	BAAMTSY	PTFSBD	PTFSFX	PTFSCOM	Adj. R^2
Panel A: Hedge funds										
Portfolio A (PRI signatories)	2.54	-1.24	0.35**	-0.06	-1.62**	-3.17**	-0.02**	0.01	-0.01	0.70
	(1.16)	(-0.97)	(10.37)	(-1.18)	(-3.24)	(-4.12)	(-2.79)	(0.80)	(-0.89)	
Portfolio B (nonsignatories)	3.99*	1.21	0.31**	0.00	-0.62	-2.16**	-0.01	0.01	0.00	0.75
	(2.27)	(1.26)	(12.79)	(0.01)	(-1.51)	(-3.52)	(-1.60)	(1.45)	(-0.42)	
Spread (A minus B)	-1.44*	-2.45**	0.04*	-0.06*	-1.01**	-1.01**	-0.01**	0.00	0.00	0.31
	(-2.06)	(-3.93)	(2.47)	(-2.52)	(-3.64)	(-2.90)	(-3.07)	(-0.36)	(-1.25)	
Panel B: Hedge funds with AUM greater than US$20 million										
Portfolio A (PRI signatories)	2.99	-0.65	0.34**	-0.06	-1.49**	-3.16**	-0.02**	0.01	-0.01	0.69
	(1.39)	(-0.50)	(9.73)	(-1.27)	(-2.97)	(-4.09)	(-2.67)	(0.76)	(-0.88)	
Portfolio B (nonsignatories)	4.21*	1.59	0.29**	-0.01	-0.52	-2.24**	-0.01	0.01	0.00	0.74
	(2.45)	(1.67)	(12.40)	(-0.23)	(-1.28)	(-3.69)	(-1.49)	(1.41)	(-0.56)	
Spread (A minus B)	-1.22	-2.24**	0.05*	-0.05*	-0.98**	-0.92**	-0.01**	0.00	0.00	0.29
	(-1.72)	(-3.52)	(2.61)	(-2.30)	(-3.57)	(-2.71)	(-2.92)	(-0.39)	(-0.99)	
Panel C: Hedge fund firms										
Portfolio A (PRI signatories)	2.59	-1.19	0.34**	-0.07	-1.73**	-2.72**	-0.02**	0.01	0.00	0.64
	(1.23)	(-0.88)	(8.95)	(-1.37)	(-3.29)	(-3.65)	(-2.96)	(0.96)	(-0.39)	
Portfolio B (nonsignatories)	4.52*	1.78	0.31**	0.02	-0.49	-2.03**	-0.01	0.01	0.00	0.77
	(2.60)	(1.95)	(13.58)	(0.57)	(-1.25)	(-3.41)	(-1.64)	(1.55)	(-0.45)	
Spread (A minus B)	-1.93*	-2.97**	0.03	-0.09**	-1.24**	-0.69	-0.02**	0.00	0.00	0.19
	(-2.40)	(-3.78)	(1.36)	(-3.26)	(-3.62)	(-1.77)	(-2.99)	(0.07)	(-0.14)	

In Panel A, every month, hedge funds are sorted independently into 2 x 3 portfolios based on PRI endorsement and hedge fund firm ESG scores. Portfolios 1A and 1B are the equal-weighted portfolios of hedge funds managed by signatory and nonsignatory firms, respectively, with bottom-tercile ESG scores. Portfolios 2A and 2B are the analogous portfolios with middle-tercile ESG scores. Portfolios 3A and 3B are the analogous portfolios with top-tercile ESG scores. PRI denotes the United Nations Principles for Responsible Investment. Firm ESG scores are the value-weighted average of the Refinitiv ESG scores of the stocks held by hedge fund firms. Performance is estimated relative to the Fung and Hsieh (2004) factors, which are the S&P 500 return minus risk-free rate (SNPMRF), Russell 2000 return minus S&P 500 return (SCMLC), change in the constant maturity yield of the US ten-year Treasury bond appropriately adjusted for the duration of the ten-year bond (BD10RET), change in the spread of Moody's BAA bond over ten-year Treasury bond appropriately adjusted for duration (BAAMTSY), bond PTFS (PTFSBD), currency PTFS (PTFSFX), and commodities PTFS (PTFSCOM), where PTFS is primitive trend following strategy. In Panel B, we report results from a coarser independent 2 x 2 sort on PRI endorsement and firm ESG scores, where firms are assigned to low and high ESG groups based on whether their ESG scores lie below or above the median ESG score. The t-statistics, derived from White (1980) standard errors, are in parentheses. The sample period is from January 2009 to April 2019. *, ** denote significance at the 5% and 1% levels, respectively.

Hedge fund portfolio	Excess return (percent/year)	Alpha (percent/year)	SNPMRF	SCMLC	BD10RET	BAAMTSY	PTFSBD	PTFSFX	PTFSCOM	Adj. R^2
Panel A: Independent 2 x 3 sort on PRI endorsement and firm ESG scores										
Portfolio 1A (PRI signatories with low ESG)	3.88	-5.62*	0.44**	0.02	-0.55	-2.91	-0.06**	0.01	-0.02	0.55
	(1.09)	(-2.29)	(6.61)	(0.29)	(-0.46)	(-1.83)	(-3.56)	(0.92)	(-1.47)	
Portfolio 1B (nonsignatories with low ESG)	8.47**	2.10*	0.36**	0.18**	-0.05	-3.04**	0.00	0.00	-0.01**	0.88
	(3.72)	(2.57)	(13.50)	(5.34)	(-0.13)	(-4.75)	(-0.42)	(1.02)	(-2.75)	
Portfolio 2A (PRI signatories with medium ESG)	6.73*	-1.64	0.48**	0.02	-1.90*	-3.55	-0.02	0.01	-0.02	0.67
	(2.36)	(-1.00)	(8.87)	(0.33)	(-2.55)	(-1.95)	(-1.74)	(1.27)	(-1.74)	
Portfolio 2B (non-PRI signatories with medium ESG)	6.86**	1.23	0.34**	0.07*	-0.02	-2.31**	0.00	0.01	-0.01**	0.85
	(3.57)	(1.55)	(12.33)	(2.42)	(-0.04)	(-3.83)	(-0.44)	(1.51)	(-2.73)	
Portfolio 3A (PRI signatories with high ESG)	5.67**	0.32	0.27**	-0.04	-0.58	-3.22**	-0.01*	0.01	-0.01*	0.72
	(3.15)	(0.30)	(8.15)	(-0.95)	(-1.16)	(-3.80)	(-2.05)	(1.41)	(-2.37)	
Portfolio 3B (nonsignatories with high ESG)	5.96**	-0.22	0.35**	0.05	-0.44	-2.50**	-0.01*	0.01	-0.01*	0.86
	(3.03)	(-0.28)	(15.55)	(1.65)	(-1.24)	(-4.88)	(-2.08)	(1.55)	(-2.09)	
Spread (1A minus 1B)	-4.59	-7.72**	0.08	-0.15	-0.50	0.13	-0.06**	0.01	-0.01	0.12
	(-1.85)	(-3.18)	(1.16)	(-1.87)	(-0.44)	(0.07)	(-3.43)	(0.59)	(-0.43)	
Spread (3A minus 3B)	-0.29	0.54	-0.08**	-0.08**	-0.14	-0.72	0.00	0.00	0.00	0.29
	(-0.39)	(0.74)	(-4.01)	(-3.52)	(-0.45)	(-1.55)	(-0.20)	(0.54)	(-0.86)	
Spread (1A minus 3A)	-1.79	-5.94**	0.17**	0.06	0.03	0.31	-0.05**	0.00	-0.01	0.26
	(-0.77)	(-3.00)	(3.04)	(0.80)	(0.03)	(0.18)	(-3.38)	(0.37)	(-0.68)	
Panel B: Independent 2 x 2 sort on PRI endorsement and firm ESG scores										
Portfolio 1A (PRI signatories with low ESG)	4.83	-4.12	0.44**	0.04	-0.35	-2.58	-0.05**	0.01	-0.01	0.55
	(1.46)	(-1.88)	(6.82)	(0.52)	(-0.32)	(-1.70)	(-3.26)	(0.70)	(-1.18)	
Portfolio 1B (nonsignatories with low ESG)	8.01**	1.90*	0.35**	0.15**	0.02	-2.88**	0.00	0.00	-0.01**	0.88
	(3.68)	(2.34)	(12.63)	(4.64)	(0.04)	(-4.54)	(-0.19)	(1.23)	(-2.67)	
Portfolio 2A (PRI signatories with high ESG)	5.87**	-0.07	0.31**	-0.02	-0.71	-3.31**	-0.01	0.01	-0.01*	0.72
	(2.98)	(-0.06)	(9.31)	(-0.48)	(-1.45)	(-3.34)	(-1.95)	(1.45)	(-2.45)	
Portfolio 2B (nonsignatories with high ESG)	6.17**	0.20	0.34**	0.05	-0.36	-2.34**	-0.01*	0.01	-0.01*	0.86
	(3.23)	(0.27)	(15.12)	(1.91)	(-1.01)	(-4.56)	(-2.05)	(1.67)	(-2.57)	
Spread (1A minus 1B)	-3.18	-6.02**	0.08	-0.11	-0.37	0.30	-0.05**	0.00	0.00	0.12
	(-1.43)	(-2.76)	(1.22)	(-1.54)	(-0.34)	(0.18)	(-3.22)	(0.28)	(-0.19)	
Spread (2A minus 2B)	-0.30	-0.27	-0.03	-0.07**	-0.35	-0.97	0.00	0.00	0.00	0.29
	(-0.49)	(-0.42)	(-1.49)	(-3.09)	(-1.26)	(-1.63)	(-0.61)	(0.74)	(-0.84)	
Spread (1A minus 2A)	-1.04	-4.05*	0.12*	0.06	0.36	0.73	-0.04**	0.00	0.00	0.26
	(-0.51)	(-2.41)	(2.20)	(0.84)	(0.37)	(0.41)	(-3.00)	(0.00)	(-0.16)	

Table 4: **Portfolio sorts on PRI endorsement and ESG scores, robustness tests**

In Panel A, every month, hedge funds are sorted into two portfolios based on whether they are managed by PRI signatory or nonsignatory firms. Spread (A minus B) is the performance difference between the equal-weighted portfolios of hedge funds managed by PRI signatory (portfolio A) and by nonsignatory firms (portfolio B), respectively. PRI denotes the United Nations Principles for Responsible Investment. Hedge fund portfolio performance is estimated relative to an augmented Fung and Hsieh (2004) model. UMD is the Carhart (1997) momentum factor. RMW and CMA are the Fama and French (2015) profitability and investment factors, respectively. PS is the Pastor and Stambaugh (2003) traded liquidity factor. BAB is the Frazzini and Pedesen (2014) betting against beta factor. MACRO is the Bali, Brown, and Caglayan (2014) macroeconomic uncertainty factor. CALL and PUT are the Agarwal and Naik (2004) out-of-the-money call and put option based factors. EM is the emerging markets factor derived from the MSCI Emerging Markets index. CORR is the Buraschi, Kosowski, and Trojani (2014) correlation risk factor. The loadings on the Fung and Hsieh factors are omitted for brevity. In Panel B, hedge funds are sorted independently into 2 x 3 portfolios based on whether they are managed by PRI signatory or nonsignatory firms and on hedge fund firm ESG scores. Firm ESG scores are the value-weighted average of the Refinitiv ESG scores of the stocks held by hedge fund firms. Spread (1A minus 1B) is the performance difference between the portfolios of hedge funds managed by PRI signatory firms with low ESG scores (portfolio 1A) and by nonsignatory firms with low ESG scores (portfolio 1B). The t-statistics, derived from White (1980) standard errors, are in parentheses. The sample period is from May 2006 to April 2019 for the sort reported in Panel A and from January 2009 to April 2019 for the double sort reported in Panel B. *, ** denote significance at the 5% and 1% levels, respectively.

Risk model	Portfolio	Alpha	UMD	RMW	CMA	PS	BAB	MACRO	CALL	PUT	EM	CORR	Adj R^2
Panel A: Sort on fund management company PRI endorsement													
FH + UMD	Spread (A minus B)	-2.42**	-0.02										0.32
		(-3.90)	(-1.37)										
FH + RMW + CMA	Spread (A minus B)	-2.22**		-0.05	-0.02								0.31
		(-3.44)		(-1.53)	(-0.73)								
FH +PS	Spread (A minus B)	-3.27**				-0.03**							0.41
		(-5.49)				(-2.77)							
FH + BAB	Spread (A minus B)	-2.17**					-0.05*						0.33
		(-3.41)					(-2.18)						
FH + MACRO	Spread (A minus B)	-2.47**						0.00					0.31
		(-4.00)						(0.33)					
FH + CALL + PUT	Spread (A minus B)	-2.78**							0.00	0.00			0.36
		(-4.18)							(-0.23)	(-0.70)			
FH + EM	Spread (A minus B)	-2.24**									0.07**		0.43
		(-3.97)									(5.95)		
FH + CORR	Spread (A minus B)	-2.40**										0.00	0.31
		(-3.85)										(0.91)	
Panel B: Double sort on fund management company PRI endorsement and ESG scores													
FH + UMD	Spread (1A minus 1B)	-7.93**	0.07										0.13
		(-3.27)	(1.54)										
FH + RMW + CMA	Spread (1A minus 1B)	-8.00**		0.12	0.13								0.12
		(-3.21)		(0.85)	(0.99)								
FH + PS	Spread (1A minus 1B)	-8.75**				0.02							0.15
		(-3.44)				(0.47)							
FH + BAB	Spread (1A minus 1B)	-6.78*					-0.08						0.12
		(-2.48)					(-0.93)						
FH + MACRO	Spread (1A minus 1B)	-7.67**						0.00					0.13
		(-3.19)						(-1.02)					
FH + CALL + PUT	Spread (1A minus 1B)	-9.43**							0.00	-0.01**			0.21
		(-3.93)							(0.40)	(-3.01)			
FH + EM	Spread (1A minus 1B)	-5.65**									0.29**		0.30
		(-2.65)									(4.02)		
FH + CORR	Spread (1A minus 1B)	-7.75**										0.00	0.12
		(-3.17)										(-0.16)	

Table 5: **Regressions on hedge fund performance**

This table reports results from OLS and Fama and MacBeth (1973) multivariate regressions on hedge fund performance. The dependent variables are hedge fund return (*RETURN*) and alpha (*ALPHA*). *RETURN* is hedge fund monthly net of fee return. *ALPHA* is Fung and Hsieh (2004) seven-factor monthly alpha where factor loadings are estimated over the last 24 months. The primary independent variables of interest are the PRI dummy (*PRI*), the low ESG dummy (*ESG_LOW*), and their interaction (*PRI*ESG_LOW*). The PRI dummy (*PRI*) takes a value of one if the hedge fund is managed by a PRI signatory firm. The low ESG dummy (*ESG_LOW*) takes a value of one if the hedge fund is managed by a firm with an ESG score in the bottom tercile. To facilitate comparison with top-tercile ESG score firms, the regressions that feature *ESG_LOW* exclude hedge funds managed by firms with middle-tercile ESG scores. Firm ESG scores are the value-weighted average of the ESG scores of the stocks held by hedge fund firms. Stock ESG scores are obtained from Refinitiv. The other independent variables are hedge fund management fee (*MGTFEE*), performance fee (*PERFFEE*), redemption notice period in months (*NOTICE*), minimum investment in millions of US dollars (*MININV*), the natural logarithm of fund size (log(*SIZE*)) where *SIZE* is in millions of US dollars, fund age in decades (*AGE*) as well as dummy variables for year-month, fund investment strategy, and fund investment region. The *t*-statistics are in parentheses. For the OLS regressions, they are derived from robust standard errors that are clustered by fund and month. For the Fama and MacBeth regressions, they are derived from Newey and West (1987) standard errors with a three-month lag. The sample period is from May 2006 to April 2019. *, ** denote significance at the 5% and 1% levels, respectively.

	OLS regressions						Fama and MacBeth (1973) regressions					
	RETURN			*ALPHA*			*RETURN*			*ALPHA*		
Independent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
PRI	-0.077**	-0.025	0.080*	-0.124**	-0.083**	0.040	-0.081	-0.039	0.062	-0.122**	-0.094**	0.009
	(-4.58)	(-1.45)	(2.34)	(-6.19)	(-4.00)	(1.05)	(-1.97)	(-1.23)	(1.61)	(-3.38)	(-2.74)	(0.20)
ESG_LOW			0.181**			0.137**			0.180**			0.143**
			(6.37)			(4.37)			(2.88)			(3.56)
*PRI*ESG_LOW*			-0.368**			-0.289**			-0.389*			-0.386**
			(-4.53)			(-3.17)			(-2.07)			(-2.72)
MGTFEE (percent)		0.013	0.041		0.018	0.010		0.002	-0.005		0.013	-0.020
		(1.12)	(1.27)		(1.22)	(0.28)		(0.09)	(-0.11)		(0.64)	(-0.50)
PERFFEE (percent)		0.000	-0.006**		0.007**	0.007**		0.000	-0.006		0.007**	0.006*
		(0.51)	(-3.21)		(7.13)	(3.23)		(0.10)	(-1.64)		(2.72)	(2.16)
NOTICE (months)		0.038**	0.044**		0.040**	0.053**		0.039**	0.049**		0.035*	0.052**
		(10.93)	(4.53)		(8.97)	(4.58)		(3.72)	(4.24)		(2.44)	(3.73)
MININV (US$m)		0.004**	0.006**		0.007**	0.008**		0.004*	0.003		0.008**	0.006*
		(4.60)	(2.75)		(7.70)	(3.38)		(2.40)	(1.41)		(3.80)	(2.28)
log(*SIZE*)		-0.029**	-0.028**		0.012**	0.007		-0.022*	-0.021		0.013	0.009
		(-8.76)	(-3.65)		(2.96)	(0.84)		(-2.52)	(-1.39)		(1.58)	(0.82)
AGE (decades)		-0.119**	-0.006		-0.041**	-0.040		-0.139**	-0.039		-0.052*	-0.062*
		(-11.22)	(-0.26)		(-3.12)	(-1.62)		(-6.10)	(-1.24)		(-2.44)	(-2.10)
Year-month dummies	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No
Strategy dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Investment region dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.186	0.186	0.253	0.082	0.082	0.061	0.106	0.118	0.129	0.071	0.079	0.076
Number of observations	571,038	546,000	69,219	435,621	421,989	60,494	156	156	124	156	156	124

Table 6: **Additional regressions on hedge fund performance**

This table reports results from OLS and Fama and MacBeth (1973) multivariate regressions on hedge fund performance. The dependent variables are backfill bias-adjusted alpha, incubation bias-adjusted alpha, unsmoothed alpha, alpha from prefee returns, and alpha (from sample that excludes activists). Alpha is Fung and Hsieh (2004) seven-factor monthly alpha where factor loadings are estimated over the last 24 months. The primary independent variables of interest are the PRI dummy (*PRI*), the low ESG dummy (*ESG_LOW*), and their interaction (*PRI*ESG_LOW*). The PRI dummy (*PRI*) takes a value of one if the hedge fund is managed by a PRI signatory firm. The low ESG dummy (*ESG_LOW*) takes a value of one if the hedge fund is managed by a firm with an ESG score in the bottom tercile. To facilitate comparison with top-tercile ESG score firms, the regressions that feature *ESG_LOW* exclude hedge funds managed by firms with middle-tercile ESG scores. Firm ESG scores are the value-weighted average of the ESG scores of the stocks held by hedge fund firms. Stock ESG scores are obtained from Refinitiv. The other independent variables are hedge fund management fee (*MGTFEE*), performance fee (*PERFFEE*), redemption notice period in months (*NOTICE*), minimum investment in millions of US dollars (*MININV*), the natural logarithm of fund size (log(*SIZE*)) where *SIZE* is in millions of US dollars, fund age in decades (*AGE*) as well as dummy variables for year-month, fund investment strategy, and fund investment region. The coefficient estimates on these fund control variables are omitted for brevity. For the OLS regressions, they are derived from robust standard errors that are clustered by fund and month. For the Fama and MacBeth regressions, they are derived from Newey and West (1987) standard errors with a three-month lag. Panel A reports estimates from the OLS regressions. Panel B reports estimates from the Fama and MacBeth regressions. The sample period is from May 2006 to April 2019. *, ** denote significance at the 5% and 1% levels, respectively.

	Dependent variable														
	Backfill bias-adjusted alpha			Incubation bias-adjusted alpha			Unsmoothed alpha			Alpha from prefee returns			Alpha (excluding activists)		
Independent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Panel A: OLS regressions															
PRI	-0.079**	-0.060**	0.054	-0.123**	-0.083**	0.040	-0.132**	-0.068**	0.010	-0.246**	-0.150**	-0.024	-0.158**	-0.118**	0.013
	(-3.50)	(-2.59)	(1.27)	(-6.17)	(-3.99)	(1.04)	(-5.43)	(-2.70)	(0.22)	(-7.40)	(-4.41)	(-0.43)	(-7.09)	(-5.06)	(0.26)
ESG_LOW			0.153**			0.137**			0.115**			0.090*			0.182**
			(4.49)			(4.38)			(3.06)			(2.15)			(4.36)
*PRI*ESG_LOW*			-0.287**			-0.289**			-0.324**			-0.788**			-0.370**
			(-2.87)			(-3.17)			(-2.88)			(-3.88)			(-2.90)
Fund controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Year-month dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Strategy dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Investment region dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.079	0.079	0.063	0.082	0.083	0.062	0.094	0.094	0.066	0.095	0.096	0.060	0.086	0.087	0.065
Number of observations	355,456	345,592	51,444	435,395	421,763	60,478	393,362	381,121	56,704	246,546	242,000	31,730	371,843	361,310	36,150
Panel B: Fama and MacBeth regressions															
PRI	-0.064	-0.055	0.027	-0.122**	-0.094**	0.009	-0.129**	-0.063	-0.035	-0.195**	-0.077	-0.019	-0.146**	-0.117**	-0.011
	(-1.70)	(-1.50)	(0.53)	(-3.38)	(-2.74)	(0.21)	(-3.16)	(-1.75)	(-0.72)	(-3.92)	(-1.75)	(-0.35)	(-3.31)	(-2.77)	(-0.14)
ESG_LOW			0.154**			0.144**			0.119*			0.081*			0.180**
			(3.53)			(3.56)			(2.58)			(2.02)			(3.47)
*PRI*ESG_LOW*			-0.370*			-0.387**			-0.343*			-0.575**			-0.274*
			(-2.29)			(-2.73)			(-2.14)			(-2.74)			(-2.01)
Fund controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Year-month dummies	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Strategy dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Investment region dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.069	0.076	0.077	0.071	0.079	0.076	0.073	0.099	0.104	0.067	0.103	0.097	0.075	0.082	0.102
Number of observations	156	156	124	156	156	124	156	156	124	106	106	74	156	156	124

Table 7: **Fund incentive alignment**
This table reports double sorts on PRI endorsement and fund incentive alignment as well as triple sorts on PRI endorsement, ESG scores, and fund incentive alignment. First, hedge funds are sorted into two groups based on (i) fund manager total delta (Agarwal, Daniel, and Naik, 2009) computed over the previous year (Panel A), (ii) the ratio of fund management fee to performance fee (Panel B) or (iii) their Ozik and Sadka (2015) governance scores (Panel C). Weak incentive alignment funds are funds with low manager total delta, high ratio of management fee to performance fee, or governance scores that are ≤ 2 out of 5. Strong incentive alignment funds are funds with high manager total delta, low ratio of management fee to performance fee, or governance scores that are ≥ 3 out of 5. Within each incentive alignment group, hedge funds are sorted every month into 2 portfolios based on PRI endorsement (Columns 1 and 4) or into 2 x 3 portfolios based on PRI endorsement and firm ESG scores (Columns 2, 3, 5, and 6). PRI denotes the United Nations Principles for Responsible Investment. Firm ESG scores are the value-weighted average of the Refinitiv ESG scores of the stocks held by hedge fund firms. Low ESG denotes firms with bottom-tercile ESG scores. High ESG denotes firms with top-tercile ESG scores. Performance is estimated relative to the Fung and Hsieh (2004) model. The *t*-statistics, derived from White (1980) standard errors, are in parentheses. The sample period is from May 2006 to April 2019. *, ** denote significance at the 5% and 1% levels, respectively.

	Alpha (percent/year)					
	Strong incentive alignment			Weak incentive alignment		
	All funds	Low ESG	High ESG	All funds	Low ESG	High ESG
Hedge fund portfolio	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Sort on fund manager total delta (Agarwal, Daniel, and Naik, 2009)						
Portfolio A (PRI signatories)	-0.40	-3.30	-0.70	-2.01	-6.65*	-0.28
	(-0.32)	(-1.52)	(-0.67)	(-1.41)	(-2.20)	(-0.24)
Portfolio B (nonsignatories)	0.56	1.39	-0.62	1.11	0.30	-0.86
	(0.61)	(1.84)	(-0.83)	(1.06)	(0.36)	(-1.09)
Spread (A minus B)	-0.96	-4.69*	-0.08	-3.12**	-6.95*	0.58
	(-1.42)	(-2.15)	(-0.12)	(-4.19)	(-2.34)	(0.51)
Panel B: Sort on the ratio of fund management fee to performance fee						
Portfolio A (PRI signatories)	-0.36	-4.43*	-0.35	-2.37	-8.56*	-0.80
	(-0.29)	(-2.04)	(-0.37)	(-1.53)	(-2.31)	(-0.77)
Portfolio B (nonsignatories)	1.13	1.55*	-0.72	1.53	1.25	-1.03
	(1.30)	(2.46)	(-0.97)	(1.44)	(1.29)	(-1.24)
Spread (A minus B)	-1.49*	-5.97**	0.36	-3.90**	-9.81**	0.23
	(-2.33)	(-2.80)	(0.52)	(-4.52)	(-2.65)	(0.32)
Panel C: Sort on fund governance score (Ozik and Sadka, 2015)						
Portfolio A (PRI signatories)	0.17	-3.11	0.18	-3.40*	-8.96**	-2.94*
	(0.15)	(-1.60)	(0.19)	(-2.10)	(-2.80)	(-2.31)
Portfolio B (nonsignatories)	2.20**	2.03**	-0.36	1.15	0.32	-1.05
	(2.63)	(2.73)	(-0.58)	(1.08)	(0.43)	(-1.09)
Spread (A minus B)	-2.04**	-5.14*	0.54	-4.55**	-9.28**	-1.90
	(-3.56)	(-2.62)	(0.73)	(-4.67)	(-2.99)	(-1.98)

Table 8: **Fund management company disciplinary disclosure and performance flags**
This table reports results from multivariate probit regressions on the probability that hedge fund firms report violations on their Form ADVs or trigger performance flags. The dependent variables include the indicator variables *VIOLATION*, *REGULATORY*, *INVESTMENT*, and *SEVERE* that capture Form ADV violations each year, as well as *KINK*, *%NEGATIVE*, *MAXRSQ*, and *%REPEAT* that capture performance flags. *VIOLATION* takes a value of one if a firm reports any violation. *REGULATORY* takes a value of one if a firm reports a regulatory violation. *INVESTMENT* takes a value of one if a firm reports an investment related violation. *SEVERE* takes a value of one if a firm reports a severe violation. *KINK* takes a value of one when any of the funds managed by a firm exhibits a discontinuity at zero in its return distribution. *%NEGATIVE* takes a value of one when any of the funds managed by a firm reports a low number of negative returns. *MAXRSQ* takes a value of one when any of the funds managed by a firm features an adjusted R^2 that is not significantly different from zero. *%REPEAT* takes a value of one when any of the funds managed by a firm reports a high number of repeated returns. The performance flag variables *KINK*, *%NEGATIVE*, *MAXRSQ*, and *%REPEAT* are estimated over each non-overlapping 24-month period post firm inception. The primary independent variable of interest is the interaction of the PRI dummy (*PRI*) with the low ESG dummy (*ESG_LOW*). The PRI dummy (*PRI*) takes a value of one for PRI signatory firms. The low ESG dummy (*ESG_LOW*) takes a value of one for bottom-tercile ESG score firms. To facilitate comparison with top-tercile ESG score firms, the regression sample excludes firms with middle-tercile ESG scores. Firm ESG scores are the value-weighted average of the ESG scores of the stocks held by hedge fund firms. Stock ESG scores are obtained from Refinitiv. The other independent variables are hedge fund firm management fee (*MGTFEE*), performance fee (*PERFFEE*), redemption notice period in months (*NOTICE*), minimum investment in millions of US dollars (*MININV*), the natural logarithm of firm size (log(*SIZE*)) where *SIZE* is in millions of US dollars, firm age in decades (*AGE*) as well as dummy variables for year, investment strategy, and investment region. The strategy and investment region of a firm correspond to the strategy and investment region with the most assets under management for the firm. The coefficient estimates on these firm control variables are omitted for brevity. The *t*-statistics, in parentheses, are derived from robust standard errors that are clustered by firm and year. The marginal effects, displayed only for the interaction term, are in brackets. The sample period is from January 2009 to April 2019. *, ** denote significance at the 5% and 1% levels, respectively.

	Form ADV violations				Bollen and Pool (2009; 2012) performance flags			
	VIOLATION	*REGULATORY*	*INVESTMENT*	*SEVERE*	*KINK*	*%NEGATIVE*	*MAXRSQ*	*%REPEAT*
Independent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PRI	-0.259	-0.321	0.018	-0.966*	-0.235	-1.104*	-0.226	-0.359
	(-1.09)	(-1.20)	(0.07)	(-2.18)	(-1.06)	(-2.17)	(-0.97)	(-1.66)
ESG_LOW	-0.545**	-0.663**	-0.441**	-0.588**	0.020	-0.203	-0.075	-0.155
	(-4.32)	(-4.65)	(-3.01)	(-3.63)	(0.20)	(-1.40)	(-0.72)	(-1.51)
*PRI*ESG_LOW*	1.160*	1.424**	1.113*	1.808**	1.162*	2.229**	1.251	1.122*
	(2.44)	(2.88)	(2.18)	(2.60)	(2.23)	(2.77)	(1.94)	(2.05)
	[0.086]	[0.101]	[0.076]	[0.086]	[0.422]	[0.278]	[0.417]	[0.417]
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Strategy dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Investment region dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R^2	0.167	0.171	0.161	0.221	0.080	0.147	0.153	0.061
Number of observations	2,120	1,924	1,730	1,906	795	774	795	795

Table 9: **Endogeneity tests with exogenous shocks**

This table reports results from OLS multivariate regressions on hedge fund investment performance and ESG exposure with exogenous shock variables. The dependent variables are hedge fund monthly return (*RETURN*), monthly alpha (*ALPHA*), and the proportionate change in quarterly ESG exposure (*ESGDELTA*). *RETURN* is hedge fund monthly net of fee return. *ALPHA* is Fung and Hsieh (2004) seven-factor monthly alpha where factor loadings are estimated over the last 24 months. *ESGDELTA* is the proportionate change in quarterly fund management company ESG score, where fund management company ESG score is the value-weighted average of the ESG scores of the stocks held by the hedge fund firm. Stock ESG scores are obtained from the Refinitiv database. The primary independent variables of interest are the PRI dummy (*PRI*) and the interaction of the PRI dummy with the exogenous shock. The PRI dummy (*PRI*) takes a value of one if the hedge fund is managed by a PRI signatory firm. The exogenous shock variables are *STEWARDSHIP* and *FTCGREENGUIDE*. *STEWARDSHIP* takes a value of one during the three months that follow the adoption of stewardship codes in the country where the hedge fund firm is based. *FTCGREENGUIDE* takes a value of one during the three months that follow the revision of the Federal Trade Commission Green Guides on October 2012. The other independent variables are hedge fund management fee (*MGTFEE*), performance fee (*PERFFEE*), redemption notice period in months (*NOTICE*), minimum investment in millions of US dollars (*MININV*), the natural logarithm of fund size (log(*SIZE*)) where *SIZE* is in millions of US dollars, fund age in decades (*AGE*) as well as dummy variables for year-month, fund investment strategy, and fund investment region. The coefficient estimates on these fund control variables are omitted for brevity. The regressions are estimated separately for low and high ESG funds. Low ESG funds belong to fund management companies that exhibit bottom tercile ESG scores. High ESG funds belong to fund management companies that exhibit top tercile ESG scores. Since the US FTC Green Guides are relevant for products and services marketed in the US, the regressions with *FTCGREENGUIDE* are estimated for the sample of hedge funds based in the US or investing in the US. The *t*-statistics in parentheses are derived from robust standard errors that are clustered by fund and month. The sample period is from May 2006 to April 2019. * Denotes significance at the 5% level; ** Denotes significance at the 1% level.

	Dependent variable											
	Low ESG funds			High ESG funds			Low ESG funds			High ESG funds		
	ESGDELTA	*RETURN*	*ALPHA*	*ESGDELTA*	*RETURN*	*ALPHA*	*ESGDELTA*	*RETURN*	*ALPHA*	*ESGDELTA*	*RETURN*	*ALPHA*
Independent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
PRI	0.004	-0.410**	-0.320**	0.002	0.075*	0.057	0.026	-0.076	0.128	0.003	0.113*	0.090
	(0.23)	(-4.39)	(-3.14)	(1.27)	(2.02)	(1.35)	(0.95)	(-0.80)	(1.37)	(1.50)	(2.52)	(1.87)
STEWARDSHIP	0.201**	0.662*	-0.185	-0.038**	0.104	-0.006						
	(3.52)	(2.24)	(-0.53)	(-4.46)	(0.66)	(-0.03)						
*PRI*STEWARDSHIP*	0.392**	1.056**	0.722*	0.029**	0.013	0.083						
	(4.36)	(3.15)	(2.23)	(4.48)	(0.08)	(0.42)						
*PRI*FTCGREENGUIDE*							0.307**	1.176*	0.560**	-0.003	-0.160	-0.254
							(9.41)	(1.99)	(2.90)	(-0.43)	(-0.97)	(-1.12)
Fund controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-month dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Strategy dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Investment region dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.033	0.287	0.062	0.055	0.235	0.061	0.015	0.282	0.058	0.052	0.238	0.043
Number of observations	8,206	28,336	25,396	10,920	36,264	31,080	7,540	25,770	23,144	8,244	27,204	23,960

Table 10: **Regressions on hedge fund and hedge fund firm flow**

This table reports results from OLS multivariate regressions on hedge fund flow and hedge fund firm flow. For the fund level regressions, the dependent variable is hedge fund annual flow (*FLOW*). The primary independent variables of interest are the PRI dummy (*PRI*), the low ESG dummy (*ESG_LOW*), and their interaction (*PRI*ESG_LOW*). The PRI dummy (*PRI*) takes a value of one if the hedge fund is managed by a PRI signatory firm. The low ESG dummy (*ESG_LOW*) takes a value of one if the hedge fund is managed by a firm with an ESG score in the bottom tercile. To facilitate comparison with top-tercile ESG score firms, the regressions that feature *ESG_LOW* exclude hedge funds managed by firms with middle-tercile ESG scores. Firm ESG scores are the value-weighted average of the ESG scores of the stocks held by hedge fund firms. Stock ESG scores are obtained from Refinitiv. The other independent variables are hedge fund past 12-month return rank (*RANK*), past 12-month CAPM alpha rank (*RANK_CAPM*), past 12-month Fung and Hsieh (2004) alpha rank (*RANK_FH*), management fee (*MGTFEE*), performance fee (*PERFFEE*), redemption notice period in months (*NOTICE*), minimum investment in millions of US dollars (*MININV*), the natural logarithm of fund size (log(*SIZE*)) where *SIZE* is in millions of US dollars, fund age in decades (*AGE*), standard deviation of fund returns over the past 12 months (*RETSTD*), as well as dummy variables for year and fund investment strategy. The coefficient estimates on these variables (except for the performance rank variables) are omitted for brevity. The firm level regressions feature the analogous firm level variables. The strategy and investment region of a firm correspond to the strategy and investment region with the most assets under management for the firm. The dependent variable in the firm level regressions is hedge fund firm annual flow (*FIRM_FLOW*). The *t*-statistics in parentheses are derived from robust standard errors that are clustered by fund and year for the fund level regressions or by firm and year for the firm level regressions. The sample period is from May 2006 to April 2019. *, ** denote significance at the 5% and 1% levels, respectively.

	Dependent variable											
	FLOW						*FIRM_FLOW*					
Independent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
PRI	0.106**	0.075**	0.069**	0.053	0.066	0.062	0.197**	0.149**	0.147**	0.131*	0.165**	0.148*
	(4.90)	(3.80)	(3.52)	(1.48)	(1.92)	(1.80)	(6.04)	(4.79)	(4.68)	(2.08)	(2.69)	(2.40)
ESG_LOW				-0.018	-0.014	-0.019				-0.011	-0.017	-0.019
				(-0.89)	(-0.71)	(-0.99)				(-0.44)	(-0.66)	(-0.74)
*PRI*ESG_LOW*				0.173	0.109	0.118				0.164	0.139	0.147
				(1.61)	(1.03)	(1.13)				(0.76)	(0.62)	(0.65)
RANK	0.482**			0.445**			0.482**			0.334**		
	(26.73)			(11.58)			(22.25)			(5.28)		
RANK_CAPM		0.298**			0.306**			0.298**			0.284**	
		(18.81)			(8.47)			(15.72)			(5.44)	
RANK_FH			0.332**			0.342**			0.339**			0.227**
			(21.72)			(9.51)			(18.25)			(4.42)
Fund/Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Strategy dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Investment region dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.098	0.052	0.056	0.082	0.062	0.068	0.110	0.060	0.066	0.073	0.073	0.069
Number of observations	30,603	23,902	23,902	4,626	4,227	4,227	18,611	15,304	15,304	2,340	2,257	2,257

Table 11: **Robustness tests**

Hedge funds are sorted every month into 2 portfolios based on PRI endorsement (Columns 1 and 4) or into 2 x 3 portfolios based on PRI endorsement and hedge fund firm ESG scores (Columns 2, 3, 5, and 6). PRI denotes the United Nations Principles for Responsible Investment. Firm ESG scores are the value-weighted average of the Refinitiv ESG scores of the stocks held by hedge fund firms. Low ESG denotes firms with bottom-tercile ESG scores. High ESG denotes firms with top-tercile ESG scores. Performance is estimated relative to the Fung and Hsieh (2004) model. FH denotes the Fung and Hsieh (2004) model. The t-statistics, derived from White (1980) standard errors, are in parentheses. The sample period is from May 2006 to April 2019. *, ** denote significance at the 5% and 1% levels, respectively.

	Alpha (percent/year)				Alpha (percent/year)		
	All funds	Low ESG	High ESG		All funds	Low ESG	High ESG
Hedge fund portfolio	(1)	(2)	(3)	Hedge fund portfolio	(4)	(5)	(6)
Panel A: Adjusted for backfill bias				Panel H: FH + Hsu, Li, and Tsou (2020) toxic emissions factor			
PRI signatories	-1.55	-5.69*	-0.17	PRI signatories	-1.26	-5.62*	0.32
	(-1.22)	(-2.22)	(-0.16)		(-0.98)	(-2.29)	(0.29)
nonsignatories	-0.15	1.80*	-1.13	nonsignatories	1.20	2.10*	-0.23
	(-0.15)	(2.26)	(-1.36)		(1.24)	(2.61)	(-0.31)
Spread (PRI minus non-PRI)	-1.41*	-7.49**	0.96	Spread (PRI minus non-PRI)	-2.45**	-7.72**	0.55
	(-2.13)	(-2.95)	(1.29)		(-3.94)	(-3.18)	(0.76)
Panel B: Adjusted for incubation bias				Panel I: Adjusted for dynamic risk exposures using rolling betas			
PRI signatories	-1.31	-6.78*	-0.57	PRI signatories	-2.45	-6.77**	-1.09
	(-0.97)	(-2.55)	(-0.53)		(-1.45)	(-2.63)	(-1.01)
nonsignatories	0.52	1.29	-0.95	nonsignatories	0.39	0.73	-1.47
	(0.55)	(1.71)	(-1.34)		(0.31)	(0.71)	(-1.54)
Spread (PRI minus non-PRI)	-1.83**	-8.07**	0.39	Spread (PRI minus non-PRI)	-2.85**	-7.50**	0.38
	(-2.68)	(-3.07)	(0.49)		(-3.57)	(-3.16)	(0.64)
Panel C: Adjusted for serial correlation				Panel J: Small investment firms			
PRI signatories	-0.76	-5.65*	0.46	PRI signatories	-1.79	-4.60	-1.80
	(-0.56)	(-2.10)	(0.42)		(-1.18)	(-1.62)	(-0.90)
nonsignatories	1.79	2.37**	0.00	nonsignatories	1.81	3.60**	-0.99
	(1.80)	(2.90)	(0.00)		(1.87)	(2.74)	(-0.82)
Spread (PRI minus non-PRI)	-2.56**	-7.19**	0.46	Spread (PRI minus non-PRI)	-3.59**	-8.19*	-0.81
	(-3.84)	(-2.72)	(0.62)		(-3.60)	(-2.40)	(-0.48)
Panel D: Pre-fee returns				Panel K: Large investment firms			
PRI signatories	1.73	-5.34	3.67*	PRI signatories	-1.15	-6.06*	-0.62
	(1.01)	(-1.50)	(2.33)		(-0.91)	(-2.30)	(-0.63)
nonsignatories	5.09**	6.07**	3.37**	nonsignatories	0.41	1.10	-0.64
	(3.94)	(6.20)	(3.30)		(0.42)	(1.46)	(-0.87)
Spread (PRI minus non-PRI)	-3.36**	-11.41**	0.30	Spread (PRI minus non-PRI)	-1.56*	-7.17**	0.02
	(-4.32)	(-3.46)	(0.31)		(-2.52)	(-2.73)	(0.03)
Panel E: Excluding activist hedge funds				Panel L: Including delisted signatories			
PRI signatories	-1.72	-5.41*	-1.00	PRI signatories	-0.62	-5.62*	0.42
	(-1.25)	(-2.15)	(-0.77)		(-0.48)	(-2.29)	(0.41)
nonsignatories	1.05	1.95*	-0.82	nonsignatories	1.40	2.10*	-0.24
	(1.05)	(2.49)	(-1.03)		(1.46)	(2.57)	(-0.31)
Spread (PRI minus non-PRI)	-2.77**	-7.36**	-0.18	Spread (PRI minus non-PRI)	-2.02**	-7.72**	0.66
	(-4.10)	(-3.04)	(-0.20)		(-3.36)	(-3.18)	(0.99)
Panel F: FH + ESG factor				Panel M: Pure play hedge fund firms			
PRI signatories	-1.26	-5.61*	0.19	PRI signatories	-1.46	-6.24*	0.51
	(-0.99)	(-2.26)	(0.18)		(-1.10)	(-2.49)	(0.46)
nonsignatories	1.18	1.81*	-0.31	nonsignatories	1.25	2.38**	0.28
	(1.23)	(2.59)	(-0.42)		(1.29)	(2.81)	(0.36)
Spread (PRI minus non-PRI)	-2.44**	-7.42**	0.50	Spread (PRI minus non-PRI)	-2.70**	-8.62**	0.23
	(-3.92)	(-3.07)	(0.67)		(-4.07)	(-3.49)	(0.27)
Panel G: FH + Bolton and Kacperczyk (2020) carbon emissions factor				Panel N: Stock holdings from 13F + FactSet			
PRI signatories	-0.67	-5.10*	0.52	PRI signatories	-1.24	-4.82*	0.01
	(-0.51)	(-2.03)	(0.47)		(-0.97)	(-2.04)	(0.01)
nonsignatories	1.55	2.08*	-0.01	nonsignatories	1.21	1.62	-0.95
	(1.60)	(2.45)	(-0.01)		(1.26)	(1.90)	(-1.11)
Spread (PRI minus non-PRI)	-2.23**	-7.18**	0.53	Spread (PRI minus non-PRI)	-2.45**	-6.45**	0.96
	(-3.37)	(-2.86)	(0.71)		(-3.93)	(-2.84)	(1.47)

Table 12: **Mutual funds**

This table reports double sorts on PRI endorsement and mutual fund incentive alignment as well as triple sorts on PRI endorsement, ESG scores, and mutual fund incentive alignment. First, mutual funds are sorted into two groups based on (i) fund expense ratio (Panel A), (ii) fund management company listing status (Panel B) or (iii) the frequency at which they vote on the shareholder proposals of their underlying portfolio companies (Panel C). Weak incentive alignment funds are funds with high expense ratios, managed by listed fund management companies, or that rarely vote on the shareholder proposals of their portfolio companies. Strong incentive alignment funds are funds with low expense ratios, managed by unlisted fund management companies, or that frequently vote on the shareholder proposals of their portfolio companies. Within each incentive alignment group, mutual funds are sorted every month into 2 portfolios based on PRI endorsement (Columns 1 and 4) or into 2 x 3 portfolios based on PRI endorsement and ESG scores (Columns 2, 3, 5, and 6). PRI denotes the United Nations Principles for Responsible Investment. ESG scores are the value-weighted average of the Refinitiv ESG scores of the stocks held by mutual funds. Low ESG denotes funds with bottom-tercile ESG scores. High ESG denotes funds with top-tercile ESG scores. Performance is estimated relative to the Carhart (1997) four-factor model. The t-statistics, derived from White (1980) standard errors, are in parentheses. The sample period is from May 2006 to April 2019. *, ** denote significance at the 5% and 1% levels, respectively

	Alpha (percent/year)					
	Strong incentive alignment			Weak incentive alignment		
	All funds	Low ESG	High ESG	All funds	Low ESG	High ESG
Mutual fund portfolio	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Sort on mutual fund expense ratio						
Portfolio A (PRI signatories)	-0.72	0.64	-1.10	-3.16**	-2.87*	-2.66**
	(-0.66)	(0.81)	(-1.97)	(-3.30)	(-2.57)	(-3.49)
Portfolio B (nonsignatories)	-0.39	-0.34	-1.20**	-2.19**	-1.41*	-2.26**
	(-0.82)	(-0.57)	(-3.81)	(-3.03)	(-2.36)	(-4.67)
Spread (A minus B)	-0.33	0.98	0.09	-0.97*	-1.47*	-0.41
	(-0.40)	(1.46)	(0.21)	(-2.50)	(-2.03)	(-0.70)
Panel B: Sort on mutual fund management company listing status						
Portfolio A (PRI signatories)	0.27	-0.71	0.25	-2.82*	-2.64*	-2.51**
	(0.24)	(-0.65)	(0.30)	(-2.40)	(-2.06)	(-3.32)
Portfolio B (nonsignatories)	-2.30**	-1.54*	-1.86**	-1.80*	-0.87	-1.82**
	(-2.92)	(-2.48)	(-4.67)	(-2.16)	(-1.29)	(-4.70)
Spread (A minus B)	2.57**	0.84	2.10**	-1.02*	-1.77*	-0.68
	(3.15)	(1.18)	(2.79)	(-2.20)	(-2.15)	(-1.32)
Panel C: Sort on mutual fund shareholder proposal voting frequency						
Portfolio A (PRI signatories)	-1.27	-1.48	-2.27**	-1.51	-2.73*	-1.66*
	(-1.43)	(-1.22)	(-3.00)	(-1.72)	(-2.23)	(-2.36)
Portfolio B (nonsignatories)	-1.71**	-1.26*	-2.01**	-1.02	-0.78	-1.41**
	(-2.89)	(-2.07)	(-4.94)	(-1.41)	(-1.15)	(-3.45)
Spread (A minus B)	0.44	-0.22	-0.26	-0.50	-1.95*	-0.25
	(0.69)	(-0.25)	(-0.40)	(-0.91)	(-2.21)	(-0.49)

Internet Appendix
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1. Additional robustness tests

We provide additional robustness tests to verify the strength of our empirical results.

1.1. Value-weighted portfolios

To test whether our findings are driven by the way we weight hedge funds in the portfolio sorts, we redo the analysis with value-weighted portfolios. Panel A of Table A2 shows that inferences remain qualitatively unchanged with value-weighted portfolios.

1.2. Lagged, contemporaneous, and forward-looking ESG scores

In our double sort analysis, we accommodate a publication lag of one year to allow investment firms time to incorporate ESG scores from third parties such as Refinitiv when making investment decisions. Panels B to D of Table A2 reveal that our findings remain qualitatively unchanged when we (i) do not allow for the publication lag, (ii) employ contemporaneous stock ESG scores, or (iii) employ one-year forward ESG scores.

1.3. Fund termination

To address concerns that funds that terminated their operations may have stopped reporting returns prematurely, we assume that for the month after a fund liquidates, its return is -10%.

Next, we redo the baseline portfolio sorts. Panel E of Table A2 indicates that our findings are robust to adjusting for fund termination.

1.4. Founding PRI signatories

To check whether our results are driven by founding PRI signatories who endorsed on 27 April 2006, we redo the baseline portfolio sorts on hedge funds that are not managed by such firms. Of the 51 pioneer PRI signatories, we identify eight that offer hedge funds. Panel F of Table A2 suggests that our findings are not driven by founding PRI signatories.

1.5. Style-adjusted fund performance

To address the concern that the Fung and Hsieh (2004) model may not adequately capture the risk exposures of individual hedge funds, we redo the analysis on style-adjusted fund returns, i.e., the difference between a fund's returns and the returns averaged across all funds in its investment style. Panel G of Table A2 shows that our results also apply to style-adjusted fund performance.

1.6. Equity funds

To cater to concerns that the 13F holdings may not constitute a sizeable portion of their investment portfolio of hedge funds in our sample, we redo the analysis on equity hedge funds, which include funds that engage in the following investment strategies: long-only, long/short, emerging markets, event-driven, short bias, sector, and market neutral. Panel H of Table A2 reveals that our results are robust to confining the analysis to equity-centric funds.

1.7. Sector funds

The industry weights for low-ESG signatories closely track those of high-ESG signatories for the vast majority (i.e., 125 out of 130 or 96%) of Refinitiv Business Classification industries. Nonetheless, as the Refinitiv ESG scores are industry adjusted there may be residual concerns that low-ESG signatories hold stocks in industries that are relatively greener and are deemed as low-ESG only because of the industry adjustment. As this problem is likely to be most acute for sector funds, we exclude sector funds from the sample and redo the baseline portfolio sorts. Panel I of Table A2 indicates that our results are robust to this adjustment.

References

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Flammer, C., 2015. Does corporate social responsibility lead to superior financial performance? A regression discontinuity design. Management Science 61, 2549–2568.

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Figure A1: UK Stewardship Code (July 2010)

Principle 1: Institutional investors should publicly disclose their policy on how they will discharge their stewardship responsibilities.

The disclosure should include:

- how investee companies will be monitored. In order for monitoring to be effective an active dialogue may, where necessary, need to be entered into with the investee company's board;
- the strategy on intervention;
- internal arrangements, including how stewardship is integrated with the wider investment process;
- the policy on voting and the use made of, if any, proxy voting or other voting advisory service, including information on how they are used; and
- the policy on considering explanations made in relation to the UK Corporate Governance Code.

Principle 2: Institutional investors should have a robust policy on managing conflicts of interest in relation to stewardship and this policy should be publicly disclosed.

An institutional investor's duty is to act in the interests of all clients and/or beneficiaries when considering matters such as engagement and voting.

Conflicts of interest will inevitably arise from time to time, which may include when voting on matters affecting a parent company or client.

Institutional investors should put in place and maintain a policy for managing conflicts of interest.

Principle 3: Institutional investors should monitor their investee companies.

Investee companies should be monitored to determine when it is necessary to enter into an active dialogue with their boards. This monitoring should be regular, and the process clearly communicable and checked periodically for its effectiveness.

As part of this monitoring, institutional investors should:

- seek to satisfy themselves, to the extent possible, that the investee company's board and committee structures are effective, and that independent directors provide adequate oversight, including by meeting the chairman and, where appropriate, other board members;

- maintain a clear audit trail, for example, records of private meetings held with companies, of votes cast, and of reasons for voting against the investee company's management, for abstaining, or for voting with management in a contentious situation; and
- attend the General Meetings of companies in which they have a major holding, where appropriate and practicable.

Institutional investors should consider carefully explanations given for departure from the UK Corporate Governance Code and make reasoned judgements in each case. They should give a timely explanation to the company, in writing where appropriate, and be prepared to enter a dialogue if they do not accept the company's position.

Institutional investors should endeavour to identify problems at an early stage to minimise any loss of shareholder value. If they have concerns they should seek to ensure that the appropriate members of the investee company's board are made aware of them.

Institutional investors may not wish to be made insiders. They will expect investee companies and their advisers to ensure that information that could affect their ability to deal in the shares of the company concerned is not conveyed to them without their agreement.

Principle 4: Institutional investors should establish clear guidelines on when and how they will escalate their activities as a method of protecting and enhancing shareholder value.

Institutional investors should set out the circumstances when they will actively intervene and regularly assess the outcomes of doing so. Intervention should be considered regardless of whether an active or passive investment policy is followed. In addition, being underweight is not, of itself, a reason for not intervening. Instances when institutional investors may want to intervene include when they have concerns about the company's strategy and performance, its governance or its approach to the risks arising from social and environmental matters.

Initial discussions should take place on a confidential basis. However, if boards do not respond constructively when institutional investors intervene, then institutional investors will consider whether to escalate their action, for example, by:

- holding additional meetings with management specifically to discuss concerns;
- expressing concerns through the company's advisers;
- meeting with the chairman, senior independent director, or with all independent directors;
- intervening jointly with other institutions on particular issues;
- making a public statement in advance of the AGM or an EGM;
- submitting resolutions at shareholders' meetings; and

- requisitioning an EGM, in some cases proposing to change board membership.

Principle 5: Institutional investors should be willing to act collectively with other investors where appropriate.

At times collaboration with other investors may be the most effective manner in which to engage.

Collaborative engagement may be most appropriate at times of significant corporate or wider economic stress, or when the risks posed threaten the ability of the company to continue.

Institutional investors should disclose their policy on collective engagement.

When participating in collective engagement, institutional investors should have due regard to their policies on conflicts of interest and insider information.

Principle 6: Institutional investors should have a clear policy on voting and disclosure of voting activity.

Institutional investors should seek to vote all shares held. They should not automatically support the board.

If they have been unable to reach a satisfactory outcome through active dialogue then they should register an abstention or vote against the resolution. In both instances, it is good practice to inform the company in advance of their intention and the reasons why.

Institutional investors should disclose publicly voting records and if they do not explain why.

Principle 7: Institutional investors should report periodically on their stewardship and voting activities.

Those that act as agents should regularly report to their clients details of how they have discharged their responsibilities. Such reports will be likely to comprise qualitative as well as quantitative information. The particular information reported, including the format in which details of how votes have been cast are presented, should be a matter for agreement between agents and their principals.

Transparency is an important feature of effective stewardship. Institutional investors should not, however, be expected to make disclosures that might be counterproductive. Confidentiality in specific situations may well be crucial to achieving a positive outcome.

Those that act as principals, or represent the interests of the end-investor, should report at least annually to those to whom they are accountable on their policy and its execution.

Those that sign up to this Code should consider obtaining an independent audit opinion on their engagement and voting processes having regard to the 12 standards in AAF 01/06 and SAS 70 . The existence of such assurance certification should be publicly disclosed.

Table A1: **Probit regressions on the likelihood of a company voting on an ESG proposal and improving its ESG score**

This table reports results from multivariate probit regressions on the likelihood of a company voting on an ESG proposal at its shareholder meeting (*ESG_PROPOSAL_VOTED*) and the likelihood of a company improving its Refinitiv ESG score (*ESG_IMPROVEMENT*). As in Flammer (2015), we focus on ESG-related proposals. We use the list of ESG-related keywords from Cao, Liang, and Zhan (2019) to search the Institutional Shareholder Services shareholder proposal database to filter out non-ESG proposals. The unit of analysis for the regressions on *ESG_PROPOSAL_VOTED* is at the shareholder proposal level. The primary independent variables of interest are the PRI hedge fund ownership dummy (*PRI_OWNERSHIP*), the low-ESG hedge fund ownership dummy (*LOW_ESG_OWNERSHIP*), and the interaction between the two. *PRI_OWNERSHIP* takes a value of one if the ownership of PRI hedge funds is greater than the ownership of non-PRI hedge funds in a company, and is zero otherwise. *LOW_ESG_OWNERSHIP* takes a value of one if the ownership of low-ESG hedge funds is greater than the ownership of high-ESG hedge funds in a company, and is zero otherwise. Low-ESG and high-ESG hedge funds are those operated by fund management companies with bottom-tercile and top-tercile ESG scores, respectively. Fund management company ESG scores are the value-weighted average of the Refinitiv ESG scores of the stocks held by hedge fund firms. The other independent variables are company level Refinitiv ESG score (*ESG*), institutional ownership (*IO*), natural logarithm of total assets (log(*FIRMSIZE*)), capital expenditure (*CAPEX*), leverage (*LEVERAGE*), profitability (*ROA*), market-to-book ratio (*MBRATIO*) as well as dummy variables for industry, year, and country. The shareholder proposal sample includes shareholder proposals for both US and global companies. The *t*-statistics, in parentheses, are derived from robust standard errors that are clustered by firm and year. The sample period is from January 2009 to April 2019. *, ** denote significance at the 5% and 1% levels, respectively.

	Dependent variables			
	ESG_PROPOSAL_VOTED		*ESG_IMPROVEMENT*	
Independent variable	(1)	(2)	(3)	(4)
PRI_OWNERSHIP	0.210**	0.093*	-0.119**	0.056
	(6.49)	(2.27)	(-4.32)	(1.52)
LOW_ESG_OWNERSHIP	-0.043	0.037	0.342**	-0.124*
	(-0.80)	(0.47)	(7.80)	(-2.07)
*PRI_OWNERSHIP*LOW_ESG_OWNERSHIP*	-0.146*	-0.227*	-0.117	-0.168
	(-2.07)	(-2.20)	(-0.48)	(-0.57)
ESG		-0.000		-0.012**
		(-0.50)		(-18.33)
IO		-0.099		0.269**
		(-1.36)		(3.31)
log(*FIRMSIZE*)		0.165**		0.009
		(16.26)		(0.69)
CAPEX		0.289		-0.170
		(1.14)		(-0.49)
LEVERAGE		-0.135*		0.049
		(-2.21)		(0.71)
ROA		-0.151*		-0.219
		(-2.04)		(-1.95)
MBRATIO		0.054**		-0.042**
		(6.68)		(-4.15)
Industry dummies	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes
Pseudo R^2	0.038	0.072	0.082	0.137
Number of observations	163,639	104,872	17,561	10,702

Table A2: **Additional robustness tests**

Hedge funds are sorted every month into 2 portfolios based on PRI endorsement (Columns 1 and 4) or into 2 x 3 portfolios based on PRI endorsement and firm ESG scores (Columns 2, 3, 5, and 6). PRI denotes the United Nations Principles for Responsible Investment. Firm ESG scores are the value-weighted average of the Refinitiv ESG scores of the stocks held by hedge fund firms. Low ESG denotes firms with bottom-tercile ESG scores. High ESG denotes firms with top-tercile ESG scores. Performance is estimated relative to the Fung and Hsieh (2004) model. The *t*-statistics, derived from White (1980) standard errors, are in parentheses. The sample period is from May 2006 to April 2019. *, ** denote significance at the 5% and 1% levels, respectively.

	Alpha (percent/year)				Alpha (percent/year)		
	All funds	Low ESG	High ESG		All funds	Low ESG	High ESG
Hedge fund portfolio	(1)	(2)	(3)	Hedge fund portfolio	(4)	(5)	(6)
Panel A: Value-weighted portfolios				Panel F: Excluding founding PRI signatories			
PRI signatories	-0.41	-2.67	0.71	PRI signatories	-1.06	-4.39	0.35
	(-0.39)	(-1.56)	(0.82)		(-0.85)	(-1.96)	(0.37)
nonsignatories	1.30	2.86**	0.28	nonsignatories	1.36	1.90*	0.21
	(1.42)	(3.13)	(0.39)		(1.41)	(2.35)	(0.29)
Spread (PRI minus non-PRI)	-1.70**	-5.53**	0.43	Spread (PRI minus non-PRI)	-2.43**	-6.28**	0.14
	(-3.25)	(-2.93)	(0.73)		(-3.50)	(-2.84)	(0.27)
Panel B: No publication lag for stock ESG scores				Panel G: Style-adjusted fund performance			
PRI signatories	-1.24	-4.32	-0.18	PRI signatories	-1.22	-2.75	0.10
	(-0.97)	(-1.94)	(-0.16)		(-1.95)	(-1.37)	(0.18)
nonsignatories	1.21	1.91*	0.21	nonsignatories	0.09	1.96**	-0.08
	(1.26)	(2.38)	(0.28)		(1.96)	(2.73)	(-0.20)
Spread (PRI minus non-PRI)	-2.45**	-6.23**	-0.39	Spread (PRI minus non-PRI)	-1.31*	-4.71*	0.18
	(-3.93)	(-2.85)	(-0.60)		(-1.98)	(-2.04)	(0.27)
Panel C: Contemporaneous stock ESG scores				Panel H: Equity funds only			
PRI signatories	-1.24	-5.90*	0.03	PRI signatories	-1.05	-6.87*	0.32
	(-0.97)	(-2.40)	(0.03)		(-0.72)	(-2.61)	(0.26)
nonsignatories	1.21	2.55**	-0.41	nonsignatories	0.74	1.56	-0.70
	(1.26)	(2.94)	(-0.52)		(0.68)	(1.84)	(-0.81)
Spread (PRI minus non-PRI)	-2.45**	-8.45**	0.44	Spread (PRI minus non-PRI)	-1.79**	-8.43**	1.03
	(-3.93)	(-3.56)	(0.62)		(-2.68)	(-3.34)	(1.18)
Panel D: One-year forward stock ESG scores				Panel I: Excluding sector funds			
PRI signatories	-1.24	-5.97*	-0.93	PRI signatories	-1.25	-5.45*	-0.63
	(-0.97)	(-2.28)	(-0.94)		(-0.97)	(-2.12)	(-0.64)
nonsignatories	1.21	2.54**	-0.21	nonsignatories	1.18	1.18	-0.81
	(1.26)	(3.16)	(-0.30)		(1.25)	(1.73)	(-1.16)
Spread (PRI minus non-PRI)	-2.45**	-8.52**	-0.71	Spread (PRI minus non-PRI)	-2.43**	-6.63*	0.18
	(-3.93)	(-3.46)	(-1.25)		(-3.76)	(-2.58)	(0.26)
Panel E: Adjusted for fund termination							
PRI signatories	-2.91*	-5.34*	-1.87				
	(-2.02)	(-2.44)	(-1.31)				
nonsignatories	-0.78	0.04	-1.71				
	(-0.64)	(0.04)	(-1.47)				
Spread (PRI minus non-PRI)	-2.13**	-5.39*	-0.16				
	(-3.38)	(-2.47)	(-0.25)				

Table A3: **Alternative ESG scores**

Every month, hedge funds are sorted independently into 2 x 3 portfolios based on PRI endorsement and firm ESG scores. Portfolios 1A and 1B are the equal-weighted portfolios of hedge funds managed by PRI signatory and nonsignatory firms, respectively, with bottom-tercile ESG scores. Portfolios 2A and 2B are the analogous portfolios with top-tercile ESG scores. PRI denotes the United Nations Principles for Responsible Investment. Firm ESG scores are the value-weighted average of the ESG scores of the stocks held by hedge fund firms. Stock ESG scores are obtained from Refinitiv, MSCI, and Sustainalytics. E&S and CG scores refer to the environmental and social as well as corporate governance components, respectively, of the Refinitiv ESG score. Performance is estimated relative to the Fung and Hsieh (2004) factors, which are the S&P 500 return minus risk-free rate (SNPMRF), Russell 2000 return minus S&P 500 return (SCMLC), change in the constant maturity yield of the US ten-year Treasury bond appropriately adjusted for the duration of the ten-year bond (BD10RET), change in the spread of Moody's BAA bond over ten-year Treasury bond appropriately adjusted for duration (BAAMTSY), bond PTFS (PTFSBD), currency PTFS (PTFSFX), and commodities PTFS (PTFSCOM), where PTFS is primitive trend following strategy. The t-statistics, derived from White (1980) standard errors, are in parentheses. The sample period is from January 2009 to April 2019. *, ** denote significance at the 5% and 1% levels, respectively.

	ESG metric							
	Refinitiv (E&S score)		Refinitiv (CG score)		MSCI		Sustainalytics	
	Excess return (percent/year)	Alpha (percent/year)	Excess return (percent/year)	Alpha (percent/year)	Excess return (percent/year)	Alpha (percent/year)	Excess return (percent/year)	Alpha (percent/year)
Hedge fund portfolio	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Portfolio 1A (PRI signatories with low ESG)	4.03	-5.38*	5.07	-4.38	3.92	-5.33	-0.20	-6.62*
	(1.14)	(-2.18)	(1.40)	(-1.82)	(0.81)	(-1.64)	(-0.06)	(-2.48)
Portfolio 1B (nonsignatories with low ESG)	8.46**	2.06*	6.96**	1.05	8.77**	2.18*	5.12*	0.57
	(3.68)	(2.53)	(3.21)	(1.47)	(2.97)	(2.02)	(2.38)	(0.84)
Portfolio 2A (PRI signatories with high ESG)	5.38**	0.26	4.80**	-0.31	7.85**	1.32	3.27	-0.81
	(3.11)	(0.25)	(2.80)	(-0.33)	(2.76)	(0.93)	(1.90)	(-0.79)
Portfolio 2B (nonsignatories with high ESG)	6.08**	-0.16	5.24**	-0.38	7.49**	1.41	3.97	-1.28
	(3.07)	(-0.19)	(2.72)	(-0.53)	(2.98)	(1.44)	(1.87)	(-1.65)
Spread (1A minus 1B)	-4.43	-7.44**	-1.89	-5.43*	-4.85	-7.51*	-5.32*	-7.20**
	(-1.78)	(-3.04)	(-0.80)	(-2.28)	(-1.55)	(-2.57)	(-2.15)	(-2.81)
Spread (2A minus 2B)	-0.71	0.41	-0.44	0.06	0.36	-0.09	-0.70	0.47
	(-1.01)	(0.70)	(-0.58)	(0.08)	(0.38)	(-0.11)	(-0.80)	(0.55)
Spread (1A minus 2A)	-1.34	-5.63**	0.27	-4.07*	-3.92	-6.66*	-3.47	-5.81*
	(-0.56)	(-2.74)	(0.12)	(-2.13)	(-1.21)	(-2.60)	(-1.49)	(-2.60)

Table A4: **Regressions on hedge fund performance controlling for past performance**
This table reports results from OLS and Fama and MacBeth (1973) multivariate regressions on hedge fund performance. The dependent variable is Fung and Hsieh (2004) seven-factor monthly alpha where factor loadings are estimated over the last 24 months (*ALPHA*). The primary independent variables of interest are the PRI dummy (*PRI*), the low ESG dummy (*ESG_LOW*), and their interaction (*PRI*ESG_LOW*). The PRI dummy (*PRI*) takes a value of one if the hedge fund is managed by a PRI signatory firm. The low ESG dummy (*ESG_LOW*) takes a value of one if the hedge fund is managed by a firm with an ESG score in the bottom tercile. The regressions that feature *ESG_LOW* exclude hedge funds managed by firms with ESG scores in the middle tercile. Firm ESG scores are the value-weighted average of the Refinitiv ESG scores of the stocks held by hedge fund firms. The other independent variables are hedge fund management fee (*MGTFEE*), performance fee (*PERFFEE*), redemption notice period in months (*NOTICE*), minimum investment in millions of US dollars (*MININV*), the natural logarithm of fund size (log(*SIZE*)) where *SIZE* is in millions of US dollars, fund age in decades (*AGE*), past 1-year fund alpha (*ALPHA1YR*), past 2-year fund alpha (*ALPHA2YR*) as well as dummy variables for year-month, fund investment strategy, and fund investment region. The *t*-statistics are in parentheses. For the OLS regressions, they are derived from robust standard errors that are clustered by fund and month. For the Fama and MacBeth regressions, they are derived from Newey and West (1987) standard errors with a three-month lag. The sample period is from May 2006 to April 2019. *, ** denote significance at the 5% and 1% levels, respectively.

	OLS regressions				Fama and MacBeth (1973) regressions			
Independent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PRI	-0.060**	0.037	-0.057**	0.036	-0.066*	0.001	-0.070*	-0.008
	(-2.86)	(0.96)	(-2.70)	(0.93)	(-2.09)	(0.03)	(-2.20)	(-0.19)
ESG_LOW		0.123**		0.124**		0.125**		0.124**
		(3.90)		(3.93)		(3.07)		(3.04)
*PRI*ESG_LOW*		-0.280**		-0.280**		-0.312*		-0.313*
		(-3.07)		(-3.07)		(-2.18)		(-2.18)
MGTFEE (percent)	0.011	0.011	0.009	0.009	0.007	-0.016	0.004	-0.014
	(0.75)	(0.33)	(0.59)	(0.26)	(0.32)	(-0.37)	(0.21)	(-0.33)
PERFFEE (percent)	0.006**	0.005*	0.006**	0.005**	0.005*	0.004	0.005*	0.004
	(5.60)	(2.51)	(5.39)	(2.60)	(2.19)	(1.49)	(2.11)	(1.39)
NOTICE (months)	0.036**	0.051**	0.036**	0.050**	0.028*	0.043**	0.028*	0.043**
	(8.16)	(4.34)	(8.11)	(4.32)	(2.16)	(3.12)	(2.19)	(3.23)
MININV (US$m)	0.007**	0.007**	0.007**	0.007**	0.007**	0.005	0.008**	0.005
	(7.36)	(3.12)	(7.46)	(3.16)	(3.69)	(1.89)	(3.88)	(1.96)
log(*SIZE*)	0.002	0.001	0.000	0.000	0.001	0.001	0.001	0.000
	(0.54)	(0.16)	(0.04)	(0.03)	(0.17)	(0.08)	(0.07)	(0.00)
AGE (decades)	-0.027*	-0.034	-0.026	-0.033	-0.031	-0.054	-0.032	-0.049
	(-2.08)	(-1.35)	(-1.95)	(-1.34)	(-1.34)	(-1.84)	(-1.41)	(-1.58)
ALPHA1yr (percent)	0.151**	0.132**			0.172**	0.160**		
	(19.53)	(6.76)			(5.41)	(3.58)		
ALPHA2yr (percent)			0.165**	0.126**			0.179**	0.178**
			(18.03)	(5.36)			(5.07)	(3.21)
Year-month dummies	Yes	Yes	Yes	Yes	No	No	No	No
Strategy dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Investment region dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.085	0.064	0.085	0.063	0.100	0.103	0.097	0.097
Number of observations	416,837	60,084	416,837	60,084	156	124	156	124

Table A5: **Endogeneity placebo tests**

This table reports results from the OLS multivariate regressions on hedge fund investment performance and ESG exposure with exogenous shock variables. The dependent variables are hedge fund monthly return (*RETURN*), monthly alpha (*ALPHA*), and the proportionate change in quarterly ESG exposure (*ESGDELTA*). *RETURN* is hedge fund monthly net of fee return. *ALPHA* is Fung and Hsieh (2004) seven-factor monthly alpha where factor loadings are estimated over the last 24 months. *ESGDELTA* is the proportionate change in quarterly fund management company ESG score, where fund management company ESG score is the value-weighted average of the Refinitiv ESG scores of the stocks held by the hedge fund firm. The primary independent variables of interest are the PRI dummy (*PRI*) and the interaction of the PRI dummy with the exogenous shock. The PRI dummy (*PRI*) takes a value of one if the hedge fund is managed by a PRI signatory firm. The exogenous shock variables are *PRESTEWARDSHIP* and *PREFTCGREENGUIDE*. *PRESTEWARDSHIP* takes a value of one during the three-month period that starts six months prior to the adoption of stewardship codes in the country where the hedge fund firm is based. *PREFTCGREENGUIDE* takes a value of one during the three-month period that starts six months prior to the revision of the Federal Trade Commission Green Guides on October 2012. The other independent variables are hedge fund management fee (*MGTFEE*), performance fee (*PERFFEE*), redemption notice period in months (*NOTICE*), minimum investment in millions of US dollars (*MININV*), the natural logarithm of fund size (log(*SIZE*)) where *SIZE* is in millions of US dollars, fund age in decades (*AGE*) as well as dummy variables for year-month, fund investment strategy, and fund investment region. The coefficient estimates on these fund control variables are omitted for brevity. The regressions are estimated separately for low and high ESG funds. Low ESG funds belong to fund management companies that exhibit bottom tercile ESG scores. High ESG funds belong to fund management companies that exhibit top tercile ESG scores. The *t*-statistics in parentheses are derived from robust standard errors that are clustered by fund and month. The sample period is from May 2006 to April 2019. * Denotes significance at the 5% level; ** Denotes significance at the 1% level.

	Dependent variable											
	Low ESG funds			High ESG funds			Low ESG funds			High ESG funds		
	ESGDELTA	*RETURN*	*ALPHA*	*ESGDELTA*	*RETURN*	*ALPHA*	*ESGDELTA*	*RETURN*	*ALPHA*	*ESGDELTA*	*RETURN*	*ALPHA*
Independent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
PRI	0.026	-0.361**	-0.307**	0.002	0.074*	0.051	0.029	-0.068	0.130	0.003	0.101*	0.080
	(1.47)	(-3.90)	(-3.03)	(1.46)	(1.98)	(1.20)	(1.05)	(-0.72)	(1.41)	(1.45)	(2.26)	(1.67)
PRESTEWARDSHIP	0.228**	-0.231	0.214	-0.045**	-0.255	0.031						
	(4.07)	(-0.65)	(0.57)	(-3.68)	(-1.48)	(0.16)						
*PRI*PRESTEWARDSHIP*	-0.220**	-0.158	0.425	0.030**	0.123	0.267						
	(-4.46)	(-0.37)	(1.01)	(3.17)	(0.75)	(1.49)						
*PRI*PREFTCGREENGUIDE*							-0.049	0.062	-0.203	0.002	0.416	0.235
							(-1.58)	(0.04)	(-0.07)	(0.26)	(1.52)	(0.88)
Fund controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-month dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Strategy dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Investment region dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.019	0.286	0.062	0.056	0.235	0.061	0.015	0.282	0.058	0.052	0.238	0.043
Number of observations	8,206	28,336	25,396	10,920	36,264	31,080	7,540	25,770	23,144	8,244	27,204	23,960