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Responsible Hedge Funds*

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Abstract

Hedge funds that endorse the United Nations Principles for Responsible Investment (PRI) underperform other hedge funds after adjusting for risk but attract greater investor flows, accumulate more assets, and harvest greater fee revenues. Consistent with an agency explanation, the underperformance is driven by PRI signatories with low environmental, social, and governance (ESG) exposures and is greater for hedge funds with poor incentive alignment. To address endogeneity, we exploit regulatory reforms that enhance stewardship and show that the ESG exposure and relative performance of signatory funds improve post reforms. Our findings suggest that some hedge funds endorse responsible investment to pander to investor preferences.

Keywords: Responsible investing, ESG, Agency problems, Incentive alignment, Greenwashing, Hedge funds, Sustainable finance, Stewardship, Principles for Responsible Investment

JEL classification: G23, Q56

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1. Introduction

Responsible investment is the approach to managing assets whereby investors incorporate environmental, social, and governance (henceforth ESG) factors into their investment and

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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 (AUM) of PRI signatories have ballooned to US$121.3 trillion in 2021.

What are the implications of investment firms' public commitment to responsible investment? Firms that endorse responsible investment could outperform when ESG concerns strengthen or when they engage with companies to improve ESG performance. However, by focusing on a smaller opportunity set that comprise green assets or that exclude sin stocks (Hong and Kacperczyk, 2009), PRI signatories may constrain their ability to deliver superior investment returns. Alternatively, some fund managers could 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.[1] In that case, the endorsement of responsible investment should be symptomatic of agency problems, which may in turn hurt investment performance.

In this study, we shed light on the investment implications of responsible investment by analyzing hedge funds managed by PRI signatories. The hedge fund industry is an important laboratory for studying responsible investment for three reasons. First, hedge funds collectively manage US$4.01 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.[2] 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.[3] 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. Third, hedge fund managers, in contrast to other alternative investment managers, are substantially more skeptical than their investors about the importance of ESG. Figure 1 reveals that according to a 2018 Preqin poll, 65% of hedge fund investors believe that ESG will become more important. Yet, only 37% of hedge fund managers believe the same. The sharp divergence in beliefs raises the possibility that hedge fund managers will endorse responsible investment to pander to investor preferences.

We find 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 results are not driven by the usual suspects that affect hedge fund performance, including fund age (Aggarwal and Jorion, 2010), fund incentive

1 Practitioners and regulators have raised concerns about greenwashing in fund management. See "Hedge fund TCI vows to punish directors over climate change," Financial Times, 2 December 2019; "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.

2 According to HFR, hedge funds collectively manage US$4.01 trillion at the end of 2021. See https://www.hfr.com/sites/default/files/articles/Q421_HFR_GIR.pdf.

3 See https://www.unpri.org/investor-tools/hedge-funds.

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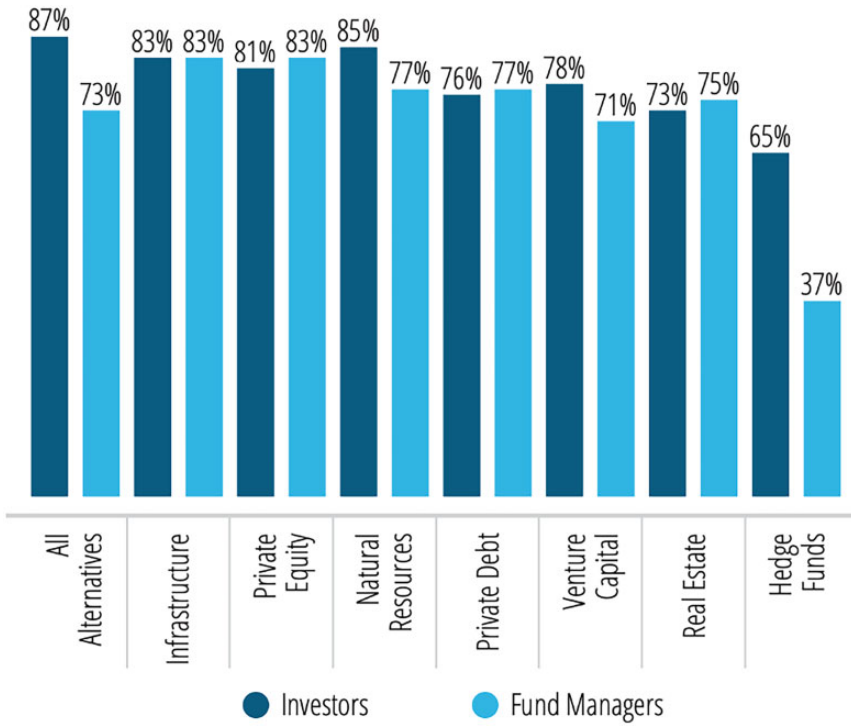

Figure 1. Investors and fund managers that believe ESG will become more important over the next 5 years.
Source: Preqin Investor and Fund Manager Surveys, June 2018. Reproduced from page 62 of https://docs.preqin.com/reports/Preqin-Future-of-Alternatives-Report-October-2018.pdf.

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).

To understand what drives the underperformance of signatory hedge funds, we leverage on Refinitiv stock ESG scores and holdings data to compute value-weighted portfolio level ESG scores for hedge fund management companies. Next, we independently sort hedge funds based on PRI endorsement and investment firm ESG scores. We find that the underperformance of hedge fund signatories can be traced to signatories with low ESG scores.[4] 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). These results are most consistent with the agency view.

4 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 and high-ESG signatories those with below-median and above-median ESG scores, respectively.

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The findings are 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 Sustainalytics. 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, 2021) 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 investigate the agency view, 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 *et al.*, 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 hedge funds managed by (i) signatories and (ii) low-ESG signatories is larger for precisely such funds.

To further explore the agency view, we test whether opportunism with respect to endorsing responsible investment provides insight into other aspects of managerial opportunism. We show that low-ESG signatories exhibit greater operational risk. They are more likely to disclose new regulatory actions, investment infractions, and severe violations on their Form ADVs, 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).[5] These results are broadly consistent with the agency view.

To tackle 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 agency problems. In line with the view that, as a result of incentive misalignment, signatories are not as responsible as they should be, we find that the ESG exposures of PRI signatories increase in the three-month period post stewardship code adoption. If agency issues lead to signatory fund underperformance, we expect that the adoption of the stewardship codes will ameliorate the underperformance of funds that endorse responsible investment. This is precisely what we find. Signatory funds underperform less in the three-month period following the adoption of such codes. The results are qualitatively similar when we analyze the 12-month period post stewardship code adoption and, as an agency story would predict, are stronger for low-ESG funds than for high-ESG funds. 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 signatory

5 However, as Jorion and Schwarz (2014) note, a return discontinuity around zero may instead reflect the imputation of incentive fees.

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funds. These findings are hard to square with an explanation based on manager skill since it is not clear why signatory skill should improve following the adoption of stewardship codes.

Next, we investigate the pecuniary benefits associated with PRI endorsement. After adjusting for past fund performance and other usual suspects, signatories attract an economically and statistically meaningful 19.7% more flows per annum than do nonsignatories. Moreover, relative to the 36-month period before PRI endorsement and to comparable nonsignatories, signatories accumulate US$83.12 m more assets, harvest US$4.08 m more fee revenues per year, and launch 0.36 more funds during the 36-month period after endorsement. In addition, low-ESG signatories attract as much fund flows as do high-ESG signatories after controlling for past performance and other factors, and there is no discernible difference in the sensitivity of flows to past performance for low- versus high-ESG signatories.

Are low-ESG signatories greenwashing? Low-ESG signatories have genuinely low ESG scores; their average ESG score falls in the bottom tercile of the stock universe. In spite of their low ESG scores, the majority of such signatories include ESG-related words on their fund management company websites. There is no evidence that they undertake ESG-related engagement. They are neither more likely to improve the ESG of their portfolio companies nor more likely to vote on an ESG-related proposal. Moreover, our baseline results extend to equity-centric hedge funds that, unlike global macro, CTA, and fixed income arbitrage funds, can be fully dedicated to ESG investment practices. These results suggest that low-ESG signatories are not as responsible as they market themselves to be.

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 signatories (and low-ESG signatories especially) underperform still holds, suggesting that agency problems also drive the underperformance of responsible mutual funds.

The findings provide novel insights relative to research that shows that responsible mutual funds, venture capital funds, and university endowments underperform due to their greater exposure to responsible firms (Riedl and Smeets, 2017; Barber, Morse, and Yasuda, 2021; Aragon *et al.*, 2022). We uncover a different channel, that is, agency, which can engender underperformance in 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 downward, and delay reporting poor performance (Agarwal, Daniel, and Naik, 2011; Teo, 2011; Patton, Ramadorai, and Streatfield, 2015; Aragon and Nanda, 2017). We show that for hedge funds, agency problems can also manifest as greenwashing. The second theme examines fund alpha and finds that less incentivized, older, high R-squared, and nondistinctive funds, as well as those launched in popular strategies underperform (Agarwal, Daniel, and Naik, 2009; Aggarwal and Jorion, 2010; Titman and Tiu, 2011; Sun, Wang, and Zheng, 2012, Cao, Farnsworth, and Zhang, 2021). We show that responsible hedge funds also underperform.[6] Moreover, we find that non-

6 Our results are not driven by hedge fund activism. The findings are qualitatively similar when we employ forward-looking ESG measures to identify low-ESG hedge fund firms or when we exclude

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responsible hedge funds with low-ESG exposures outperform as their unwillingness to falsely commit to responsible investment and preference to remain unconstrained by ESG motives signal strong incentive alignment.

This study complements Kim and Yoon (2020) and Gibson *et al.* (2022) who investigate mutual fund firms and institutional investors that endorse the PRI, respectively. Unlike us, they find marginal differences in returns between signatories and nonsignatories.[7] By focusing on hedge funds, with their lower levels of transparency, disclosure, and regulatory oversight, and therefore greater susceptibility to agency problems, we obtain stronger evidence of signatory underperformance. In addition, we trace signatory underperformance to low-ESG signatories, connect the underperformance to incentive alignment issues and regulatory reforms that enhance stewardship, and show that low-ESG signatories exhibit greater operational risk, thereby advancing the agency view.

2. Data and Methodology

2.1 United Nations PRI

The United Nations PRI is the world's leading proponent of responsible investment. It was established on April 27, 2006, with twenty-one original institutions and fifty-one founding signatories. By December 2021, more than 3,800 asset owners, investment managers, and service providers have joined the PRI network, and total AUM by PRI signatories have exceeded US$121 trillion.

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. Given that PRI's own assessment is based on "self-reported" data, we use ESG ratings from leading data providers to more objectively assess ESG exposure.

PRI signatories are expected to adhere to the following six PRI: (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; and (VI) to report their activities and progress toward implementing the Principles.

According to the PRI, most listed equity and fixed income investors use screening as part of their investment process.[8] 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,

activists. The forward-looking measures of ESG exposure help address the possibility that some hedge funds, for example, shareholder activists, may invest in companies with a view toward improving company ESG performance. We note that the majority of the hedge funds in our sample are not activists. Of the 307 hedge fund signatories in our sample, only 44 operate activist hedge funds.

7 See Table IA.7 in Gibson *et al.* (2022) and Tables 8 and 11 in Kim and Yoon (2020).

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

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signatories with significant exposure to low-ESG companies are not adhering to a key principle for responsible investment.

2.2 Hedge Fund Data

We evaluate hedge funds using monthly net of fee returns and AUM 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 15,997 hedge funds, of which 3,881 are live funds and 12,116 are dead funds. We exclude duplicate share classes from the sample due to concerns that funds with multiple share classes could cloud the analysis.[9] 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 inception date.[10]

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, 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 I 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 sixty signatory hedge fund firms operating ninety 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 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. Figure 2 illustrates the growth in signatory versus nonsignatory hedge funds over the sample period.

Following Joenväärä *et al.* (2021), we classify funds into twelve investment styles: CTA, emerging markets, event driven, global macro, long/short, long only, market neutral, multistrategy, 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

9 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 *et al.* (2021).

10 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 or returns trimmed at the 0.5th and 99.5th percentiles.

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Table I. 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 AUM for PRI signatory and nonsignatory firms at the end of each year. 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. * and ** 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

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

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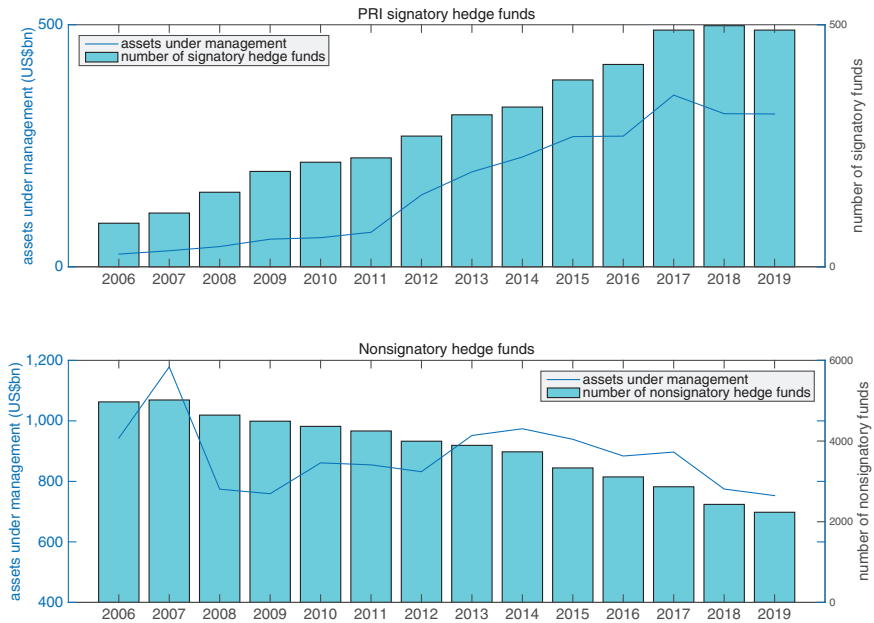

Figure 2. PRI signatory growth in the hedge fund industry. PRI denotes the United Nations Principles for Responsible Investment. The line graphs depict the AUM of PRI signatories in billions of US dollars (*y*-axis on the left). The bar graphs depict the number of hedge funds (*y*-axis on the right). The top subplot illustrates the number and AUM of signatory hedge funds. The bottom subplot illustrates the number and AUM of nonsignatory hedge funds.

specific sectors or industries. Funds that do not fit into these eleven 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 address 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

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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.[11] 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 data from Refinitiv (formerly Thomson Reuters ASSET4). 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 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. Since Refinitiv ESG percentile ratings are rescaled and adjusted every year, especially as more equity indices are included in the sample, ESG scores measured at distant points in time may not be comparable. Therefore, 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 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 thirteen issue areas. As the potential number of strengths and concerns within each issue area can differ (Mănescu, 2011), to facilitate 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

11 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.

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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 2,831 funds. Within this group of funds, 2,628 funds hold stocks with valid Refinitiv ESG scores during the sample period.[12] 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 contain international stock holdings information.

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 suggests that there are a number of signatories that do not walk the talk.

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.

On average, 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 I, that is, 29.54%, and the HFR estimate of assets managed by the hedge fund industry at the end of 2021, that is, US$4.01 trillion, the 17.05% estimate implies that a substantial US$202 billion of hedge fund assets are managed by signatories with ESG exposures below that of the median hedge fund firm.

One 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

12 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.

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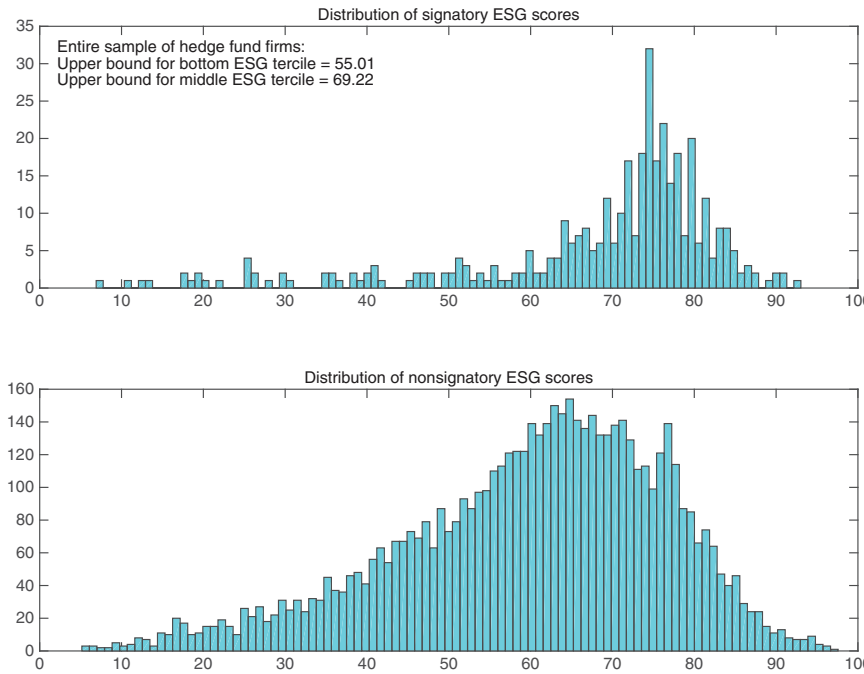

Figure 3. Firm ESG scores for PRI signatories and nonsignatories. PRI denotes the United Nations Principles for Responsible Investment. Firm ESG scores are the value-weighted average of the Refinitiv ESG scores of the stocks held by hedge fund firms computed quarterly and averaged over the year. The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

positions. Nonetheless, to sidestep this issue, we will redo our tests after reclassifying as low-ESG signatories those with low exposure to a factor-mimicking stock portfolio for ESG.

Panel B of Table I 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 understand the performance implications of PRI endorsement, we first sort hedge funds every month into two equal-weighted portfolios based on whether their fund management companies were PRI signatories last month. The post-formation returns on these two

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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 II indicates that signatory hedge funds underperform nonsignatory hedge funds. 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.

Panels B and C reveal that inferences remain qualitatively unchanged when we exclude small funds with AUM below US$20 million from the sample or when we value-weight the hedge fund portfolios. Panel D indicates that the findings also apply at the fund management company level. 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.

The underperformance of funds that endorse the PRI could be driven by their greater exposure to responsible companies. Pástor, Stambaugh, and Taylor (2021) 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 agency problems at signatory firms.

To investigate, every month, we independently double sort hedge funds into 2 × 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. The terciles are determined monthly based on the ESG scores of the entire sample of hedge fund firms. When averaged over the entire sample period, the tercile cutoffs are 55.01 and 69.22. To ensure that there is at least one fund in each of the six portfolios, we sort funds starting in January 2009.[13]

Panel A of Table III indicates that the underperformance of signatory hedge funds is not driven by a greater exposure to 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.[14] 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).

13 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, that is, from August 2009 onward, when there are at least ten funds in each portfolio.

14 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.

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Table II. 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 AUM greater than US$20 million. In Panel C, we report results for value-weighted hedge fund portfolios. In Panel D, 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. * and ** 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)	

(continued)

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Table II. Continued

Panel B: Hedge funds with AUM greater than US$20 million										
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 funds (value-weighted portfolios)										
Portfolio A (PRI signatories)	2.34	−0.41	0.25**	−0.09*	−1.31**	−3.28**	−0.02*	0.00	−0.01	0.69
	(1.33)	(−0.39)	(8.72)	(−2.47)	(−2.93)	(−5.63)	(−2.32)	(0.53)	(−1.00)	
Portfolio B (nonsignatories)	3.26*	1.30	0.22**	−0.05	−0.52	−2.17**	0.00	0.01	0.00	0.64
	(2.27)	(1.42)	(9.34)	(−1.62)	(−1.36)	(−4.27)	(−0.85)	(1.27)	(−0.61)	
Spread (A minus B)	−0.92	−1.70**	0.02	−0.04	−0.79**	−1.11**	−0.01**	0.00	0.00	0.32
	(−1.45)	(−3.25)	(1.63)	(−1.95)	(−3.68)	(−5.27)	(−3.24)	(−0.84)	(−1.01)	
Panel D: 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)	

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Table III. Double sorts on PRI endorsement and ESG scores

In Panel A, every month, hedge funds are sorted independently into 2 × 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 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 × 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. * and ** 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 × 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)	

(continued)

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Table III. Continued

Hedge fund portfolio	Excess return (percent/year)	Alpha (percent/year)	SNPMRF	SCMLC	BD10RET	BAAMTSY	PTFSBD	PTFSFX	PTFSCOM	Adj. R^2
Panel A: Independent 2 × 3 sort on PRI endorsement and firm ESG scores										
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 × 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)	

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Moreover, among 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).[15] As Panel B of Table III 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. These findings are most consistent with an agency explanation.

Figure 4 illustrates the cumulative abnormal returns of the hedge fund portfolios in Tables II and III. 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 low-ESG signatories.

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 Tables II and III portfolio sorts. Table IV 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 scores. Next, we repeat the same exercise using ESG scores from MSCI and Sustainalytics. Table A2 of the Online 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:

15 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 ESG scores are known prior to firm investment. Panel A in Table A1 of the Online Appendix indicates that inferences do not change when we do not allow for a one-year publication lag. Panels B and C in Online Appendix Table A1 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 toward improving their ESG performance.

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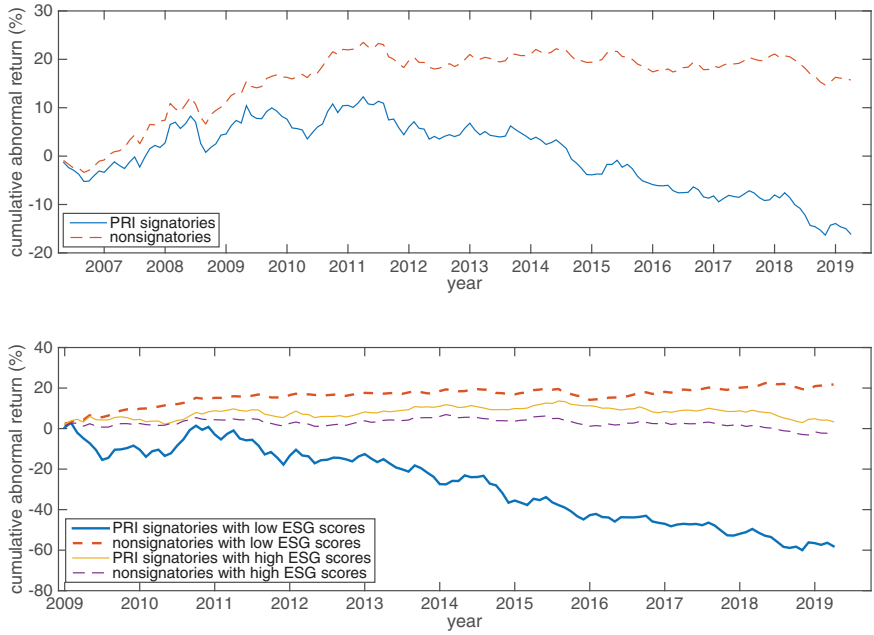

Figure 4. Cumulative abnormal returns of hedge funds sorted on PRI endorsement and firm ESG scores. Every month, hedge funds are sorted into two portfolios based on PRI endorsement (top graph) or sorted independently into 2 × 3 portfolios based on PRI endorsement and firm ESG scores (bottom graph). The 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.

$$\begin{aligned}\text{ALPHA}_{im} = a + b\text{PRI}_{im} + c\text{MGTFEE}_i + d\text{PERFFEE}_i + e\text{NOTICE}_i + f\text{MININV}_i \\ + g\log(\text{SIZE}_{im-1}) + h\text{AGE}_{im} + \sum_k p^k \text{STRATDUM}_i^k \\ + \sum_l q^l \text{REGIONDUM}_i^l + \sum_s r^s \text{YEARMONTHDUM}_m^s + \epsilon_{im},\end{aligned} \tag{1}$$

where ALPHA is the fund alpha, PRI is an indicator variable that takes a value of 1 when a fund is managed by a PRI signatory, MGTFEE is the fund management fee in percentage, PERFFEE is the fund performance fee in percentage, NOTICE is the fund redemption notification period in months, MININV is the fund minimum investment in US$ millions, SIZE is the 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.[16] Fund alpha is monthly abnormal return

16 The investment regions are North America, Asia, Australasia, Emerging Markets, Europe, and Global.

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Table IV. 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 Pástor and Stambaugh (2003) traded liquidity factor. BAB is the Frazzini and Pedersen (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 × 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. * and ** 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)	−2.96**				−0.03**							0.41
		(−5.06)				(−3.00)							
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)					

(continued)

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Table IV. Continued

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 + 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)	−7.75**				0.00							0.15
		(−3.23)				(−0.10)							
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)	

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from the Fung and Hsieh (2004) model, with the factor loadings estimated over the prior 24 months.[17] 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 estimate on PRI reported in Column 5 of Table V indicates that, after adjusting for the various fund characteristics that could explain fund performance, signatory hedge funds underperform nonsignatory hedge funds by a risk-adjusted 0.95% per annum (t-statistic = 3.79). To test whether the underperformance of PRI signatories relates to low-ESG funds, 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 1 for hedge funds managed by firms with bottom-tercile ESG scores.[18] Column 6 indicates that low-ESG signatory funds underperform low-ESG nonsignatory funds by a risk-adjusted 3.00% per annum, suggesting that some but not all of the 7.72% per annum underperformance of the low-ESG signatory fund portfolio in Table III can be ascribed to co-variation with fund characteristics.[19] 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.

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 7–12 of Table V.

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 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, we check 13D filings. We identify 432 activist hedge fund managers, of which 44 are signatories and 23 report returns after endorsing PRI. Table A3 of the Online Appendix reveals that our regression results are robust to these adjustments. In results that are available upon request, we find that

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

18 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 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 1 for hedge funds managed by firms with middle-tercile ESG scores.

19 The inferred alpha difference between low-ESG signatory and low-ESG nonsignatory funds, that is, –3.00% per annum, is simply twelve times the sum of the coefficient estimate on PRI and that on the interaction between PRI and ESG_LOW, that is, $12 \times (0.040 - 0.290)$. The aforementioned sum of the betas is statistically distinguishable from zero at the 1% level with an F-statistic of 5.04.

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Table V. 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 1 if the hedge fund is managed by a PRI signatory firm. The low ESG dummy (ESG_LOW) takes a value of 1 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. * and ** 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	−0.081**	−0.028	0.080*	−0.121**	−0.079**	0.040	−0.085*	−0.042	0.060	−0.113**	−0.086*	0.008
	(−4.81)	(−1.61)	(2.33)	(−6.02)	(−3.79)	(1.05)	(−2.26)	(−1.39)	(1.58)	(−3.16)	(−2.55)	(0.16)
ESG_LOW			0.181**			0.136**			0.180**			0.143**
			(6.35)			(4.36)			(2.88)			(3.56)
PRI*ESG_LOW			−0.371**			−0.290**			−0.383*			−0.383**
			(−4.56)			(−3.18)			(−2.04)			(−2.69)
MGTFEE (%)		0.015	0.042		0.013	0.010		0.002	−0.004		0.007	−0.020
		(1.23)	(1.30)		(0.88)	(0.28)		(0.10)	(−0.10)		(0.37)	(−0.48)
PERFFEE (%)		0.001	−0.006**		0.007**	0.007**		0.001	−0.006		0.006*	0.006*
		(0.69)	(−3.22)		(6.77)	(3.23)		(0.14)	(−1.63)		(2.58)	(2.13)

(continued)

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Table V. Continued

	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)
NOTICE (months)		0.036**	0.044**		0.043**	0.053**		0.037**	0.049**		0.039**	0.052**
		(10.30)	(4.49)		(9.60)	(4.55)		(3.75)	(4.23)		(2.83)	(3.75)
MININV (US$m)		0.004**	0.006**		0.007**	0.008**		0.005**	0.003		0.008**	0.006*
		(4.88)	(2.75)		(7.39)	(3.37)		(2.74)	(1.39)		(3.89)	(2.29)
log(SIZE)		−0.030**	−0.028**		0.013**	0.007		−0.022*	−0.021		0.014	0.010
		(−8.95)	(−3.66)		(3.19)	(0.83)		(−2.52)	(−1.37)		(1.78)	(0.85)
AGE (decades)		−0.117**	−0.005		−0.044**	−0.040		−0.138**	−0.038		−0.056**	−0.062*
		(−11.01)	(−0.25)		(−3.38)	(−1.63)		(−5.82)	(−1.21)		(−2.76)	(−2.09)
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	0.083	0.061	0.111	0.121	0.129	0.074	0.081	0.076
Number of observations	571,038	546,000	69,219	435,621	421,989	60,494	156	156	124	156	156	124

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inferences do not change when we control for past one- and two-year fund alpha in the regressions.

3.2 Incentive Alignment

To test whether the underperformance of signatory funds is driven by agency problems, we first sort funds into two groups based on metrics that capture incentive alignment between fund management and investors: manager total delta (Agarwal, Daniel, and Naik, 2009), the ratio of fund management fee to performance fee (Fung *et al.*, 2021), 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 0 to 5, 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. 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 sort on PRI endorsement and the double sort on PRI endorsement and investment firm ESG scores.

Table VI supports the agency view. It indicates that our baseline sort results are stronger for funds whose incentives are less aligned with their investors. For low-manager total delta, high-management fee to performance fee, and low-governance score funds, the risk-adjusted underperformance of signatory funds is 3.12%, 3.90%, and 4.55% 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 signatory funds is only 0.96%, 1.49%, and 2.04% per annum, respectively. Moreover, the risk-adjusted fund underperformance of low-ESG signatories is also larger for funds with poorer incentive alignment.

3.3 Operational Risk

To further investigate the agency view, we test whether opportunism with respect to the endorsement of responsible investment provides insight into other aspects of managerial opportunism. Specifically, we conjecture that low-ESG signatories 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. Moreover, they 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 Equation (1) as well as ESG_LOW and the interaction of ESG_LOW with PRI. The probit regressions include as dependent variables the following four indicator variables: VIOLATION, REGULATORY, INVESTMENT, and SEVERE

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Table VI. 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 $\leq$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 $\geq$3 out of 5. Within each incentive alignment group, hedge funds are sorted every month into two portfolios based on PRI endorsement (Columns 1 and 4) or into 2 $\times$ 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. * and ** denote significance at the 5% and 1% levels, respectively.

	Alpha (percent/year)					
	Strong incentive alignment			Weak incentive alignment		
Hedge fund portfolio	All funds (1)	Low ESG (2)	High ESG (3)	All funds (4)	Low ESG (5)	High ESG (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)

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that takes values of 1 when a firm reports any violation, a regulatory violation, an investment violation, and a severe violation, respectively.[20] 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 1 if and only if the year overlaps with the date range for the specific violation. Columns 1–4 of Table VII 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 8.8% 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%.

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 1 when the corresponding flag is triggered by at least one fund managed by the firm over each non-overlapping 24-month period post inception. Columns 5–8 of Table VII indicate that relative to high-ESG signatories, low-ESG signatories 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 PRI endorsement 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.[21] 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:

20 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.

21 To clarify, such funds intend to honor their commitment to responsible investment after endorsing the PRI but are too incompetent to properly execute their ESG strategy. In our view, this is distinct from agency problems. Funds that are afflicted by agency issues endorse the PRI for capital raising reasons and do not intend to fulfil their commitments to responsible investing. In our work, we distinguish manager skill from agency problems. The former relates to manager's ability to outperform while the latter relates to manager's motivation to outperform.

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Table VII. 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 1 if a firm reports any violation. REGULATORY takes a value of 1 if a firm reports a regulatory violation. INVESTMENT takes a value of 1 if a firm reports an investment-related violation. SEVERE takes a value of 1 if a firm reports a severe violation. KINK takes a value of 1 when any of the funds managed by a firm exhibits a discontinuity at zero in its return distribution. %NEGATIVE takes a value of 1 when any of the funds managed by a firm reports a low number of negative returns. MAXRSQ takes a value of 1 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 1 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 1 for PRI signatory firms. The low ESG dummy (ESG_LOW) takes a value of 1 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 AUM 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. * and ** denote significance at the 5% and 1% levels, respectively.

	Form ADV violations				Bollen and Pool (2009, 2012) performance flags			
Independent variable	VIOLATION (1)	REGULATORY (2)	INVESTMENT (3)	SEVERE (4)	KINK (5)	%NEGATIVE (6)	MAXRSQ (7)	%REPEAT (8)
PRI	−0.262	−0.324	0.019	−0.994*	−0.227	−1.110*	−0.239	−0.352
	(−1.09)	(−1.19)	(0.07)	(−2.19)	(−1.02)	(−2.17)	(−1.03)	(−1.63)
ESG_LOW	−0.549**	−0.667**	−0.443**	−0.593**	0.018	−0.208	−0.082	−0.152
	(−4.35)	(−4.68)	(−3.03)	(−3.66)	(0.18)	(−1.44)	(−0.79)	(−1.48)

(continued)

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Table VII. Continued

	Form ADV violations				Bollen and Pool (2009, 2012) performance flags			
Independent variable	VIOLATION (1)	REGULATORY (2)	INVESTMENT (3)	SEVERE (4)	KINK (5)	%NEGATIVE (6)	MAXRSQ (7)	%REPEAT (8)
PRI*ESG_LOW	1.186*	1.458**	1.169*	1.913**	1.149*	2.231**	1.241	1.114*
	(2.50)	(2.95)	(2.27)	(2.72)	(2.20)	(2.75)	(1.92)	(2.03)
	[0.088]	[0.103]	[0.079]	[0.090]	[0.417]	[0.278]	[0.414]	[0.413]
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	0.169	0.173	0.165	0.224	0.080	0.148	0.152	0.062
Number of observations	2,120	1,924	1,730	1,906	795	774	795	795

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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 among asset managers. The reduction in agency problems should in turn improve both signatory ESG exposure and fund performance. Figure A1 of the Online Appendix showcases the UK stewardship code adopted on July 2010.[22]

To test whether the adoption of stewardship codes, by mitigating agency problems, improves signatory ESG exposure, we estimate regressions on the proportionate change in quarterly fund ESG exposure with PRI, STEWARDSHIP, and their interaction as the independent variables of interest. STEWARDSHIP is an indicator variable that takes a value of 1 during the 3 months that follow the adoption of stewardship codes in the country where the hedge fund firm is based. The regressions also control for the fund variables featured in Equation (1). In line with the view that stewardship code adoption reduces agency problems at signatory funds, we find in Column 1 of Panel A in Table VIII that signatories increase their ESG exposures by 16.6% following stewardship code adoption.

If agency problems drive the underperformance of signatory hedge funds, we should observe that the adoption of stewardship codes ameliorates the underperformance of such funds. This is indeed what we find. Column 3 of Panel A reveals that, after adjusting for risk, signatory hedge funds underperform by 67.4 basis points per month *less* following stewardship code adoption. Moreover, consistent with the view that agency issues are particularly rife at low-ESG signatories, Columns 4–9 of Panel A indicate that the improvement in ESG exposures and fund performance is stronger for low-ESG signatory funds than for high-ESG signatory funds.

The results are not simply the by-product of the increase in ESG exposures post stewardship code adoption directly affecting the returns of signatories. Pástor, Stambaugh, and Taylor (2021) 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. If anything, the increase in ESG exposures should worsen signatory underperformance. Moreover, as Panel B of Table VIII shows, inferences remain unchanged when we study signatory performance over the longer 12-month period post stewardship code adoption, thereby suggesting that our results cannot be attributed to the buying pressure on high-ESG stocks post stewardship code adoption "temporarily" boosting the prices of the high-ESG stocks held by PRI signatories. In results that are available upon request, we also find no evidence of a reversal in the performance of signatory funds in the 18-month or 24-month period that starts 12 months after the stewardship code adoption, which is inconsistent with the price pressure view. Overall, the findings from Table VIII are hard to square with an explanation based on manager skill since it is not clear why the skill

22 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 USA. For countries that revised their stewardship codes or adopted different stewardship codes over time, for example, the UK, we focus on the date on which the first set of stewardship codes was adopted by the country.

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Table VIII. Endogeneity tests with exogenous shocks

This table reports results from OLS multivariate regressions on hedge fund ESG exposure and investment performance with exogenous shock variables. The dependent variables are ESGDELTA, RETURN, and ALPHA. 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. 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) and the interaction of the PRI dummy with the exogenous shock. The PRI dummy (PRI) takes a value of 1 if the hedge fund is managed by a PRI signatory firm. The exogenous shock variables are STEWARDSHIP and STEWARDSHIP2. STEWARDSHIP takes a value of 1 during the 3 months that follow the adoption of stewardship codes in the country where the hedge fund firm is based. STEWARDSHIP2 takes a value of 1 during the 12 months that follow the adoption of stewardship codes in the country where the hedge fund firm is based. 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. Low- and high-ESG funds are funds managed by firms with bottom- and top-tercile ESG scores, respectively. The *t*-statistics in parentheses are derived from robust standard errors that are clustered by fund and quarter in the regressions on the proportionate change in quarterly ESG score and by fund and month in the regressions on fund return and alpha. The sample period is from May 2006 to April 2019. * and ** denote significance at the 5% and 1% levels, respectively.

	All hedge funds			Low-ESG funds			High-ESG funds		
Independent variable	ESGDELTA (1)	RETURN (2)	ALPHA (3)	ESGDELTA (4)	RETURN (5)	ALPHA (6)	ESGDELTA (7)	RETURN (8)	ALPHA (9)
Panel A: Regressions with STEWARDSHIP									
PRI	0.007	−0.029	−0.095**	0.034	−0.466**	−0.369**	0.010**	0.075*	0.052
	(1.87)	(−1.52)	(−4.16)	(1.10)	(−5.03)	(−3.67)	(4.19)	(2.00)	(1.24)
STEWARDSHIP	−0.027	−0.240**	−0.945**	0.193	−0.302	−1.196**	−0.040**	−0.035	−0.248
	(−1.48)	(−3.88)	(−11.89)	(1.37)	(−0.79)	(−2.77)	(−2.98)	(−0.20)	(−1.17)
PRI*STEWARDSHIP	0.166**	0.467**	0.674**	0.666**	2.079**	1.711**	0.036**	0.040	0.245
	(4.17)	(3.84)	(4.93)	(4.57)	(4.87)	(3.59)	(3.33)	(0.22)	(1.14)
Fund controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

(continued)

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Table VIII. Continued

	All hedge funds			Low-ESG funds			High-ESG funds		
Independent variable	ESGDELTA (1)	RETURN (2)	ALPHA (3)	ESGDELTA (4)	RETURN (5)	ALPHA (6)	ESGDELTA (7)	RETURN (8)	ALPHA (9)
Panel A: Regressions with STEWARDSHIP									
Year-month dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Strategy dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Investment region dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.020	0.176	0.075	0.053	0.287	0.063	0.073	0.235	0.061
Number of observations	39,341	471,798	364,542	8,312	28,336	25,396	11,039	36,264	31,080
Panel B: Regressions with STEWARDSHIP2									
PRI	−0.002	−0.029	−0.090**	−0.049	−0.613**	−0.425**	0.007**	0.084*	0.073
	(−0.66)	(−1.45)	(−3.76)	(−1.64)	(−5.98)	(−3.84)	(2.81)	(2.15)	(1.66)
STEWARDSHIP2	−0.044**	0.044	−0.120**	−0.084	−0.409*	−0.468*	−0.043**	−0.066	−0.012
	(−5.01)	(1.48)	(−3.15)	(−1.39)	(−2.47)	(−2.27)	(−5.99)	(−0.77)	(−0.11)
PRI*STEWARDSHIP2	0.127**	0.135*	0.139*	0.550**	1.210**	0.670**	0.032**	−0.053	−0.105
	(7.36)	(2.32)	(2.11)	(7.76)	(5.73)	(2.82)	(5.61)	(−0.53)	(−0.95)
Fund controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-month dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Strategy dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Investment region dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.021	0.176	0.075	0.057	0.287	0.062	0.075	0.235	0.061
Number of observations	39,341	471,798	364,542	8,312	28,336	25,396	11,039	36,264	31,080

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of signatory funds relative to that of nonsignatory funds should improve with stewardship code adoption.

3.5 Investor Flows

What are the pecuniary benefits of PRI endorsement? To test, 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 Equation (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).

Table IX indicates that signatory hedge funds attract greater investor flows after controlling for past fund performance and a variety of fund characteristics. The coefficient estimates on FLOW in the regressions with RANK indicate that PRI endorsement is associated with a 10.6% increase in annual hedge fund flow and with a 19.7% increase in annual hedge fund firm flow. These results echo those of Hartzmark and Sussman (2019) on mutual funds.

To complement the flow regressions, we conduct an event study around PRI endorsement and evaluate fund AUM, fund fee revenues, firm AUM, firm fee revenues, number of funds launched by firms, and firm ESG scores via a difference-in-differences methodology. Table A4 of the Online Appendix indicates that relative to the 36-month period before PRI endorsement and to comparable nonsignatories, signatories accumulate US$83.12 m more assets, harvest US$4.08 m per annum more fee revenues, launch 0.36 more funds, and decrease ESG exposure by 2.35 in the 36-month period post-PRI endorsement.

Table IX 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 4–6 are statistically indistinguishable from zero at the 10% level. Columns 10–12 reveal similar results for firm level flows. 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 low- and high-ESG signatory funds.

Why do low-ESG signatories still attract investors despite not walking the talk? We believe there are two reasons for this. First, 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 signatories and the percentage of high-ESG signatories with duplicate share classes are 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 more duplicate share classes, low-ESG signatories effectively lower investor search and entry costs. Second, 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).

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Table IX. 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 1 if the hedge fund is managed by a PRI signatory firm. The low ESG dummy (ESG_LOW) takes a value of 1 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 AUM 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. * and ** 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)

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Table IX. Continued

	Dependent variable											
	FLOW						FIRM_FLOW					
Independent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
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

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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.

3.6 Discussion

Are low-ESG signatories greenwashing? We provide some evidence that suggests that low-ESG signatories are not as responsible as they market themselves to be. First, low-ESG 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. Second, there is no evidence that they conduct ESG-related engagement. Signatories with low ESG scores are 92.9% likely to have low ESG scores the next year. Moreover, Table A5 of the Online 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. Third, Panel D in Table A1 of the Online Appendix reveals that our findings also apply to equity-centric hedge funds which, unlike global macro and CTA funds, can be fully dedicated to ESG investment practices. Fourth, in spite of their low-ESG scores and lack of engagement, the majority of low-ESG signatories (i.e., 90.48%) include ESG-related words on their fund management company websites.[23]

There are, however, two limitations to this view. First, some low-ESG signatory hedge funds may be running strategies (e.g., macro and CTAs) that cannot be fully dedicated to ESG investment practices. Table A6 of the Online Appendix indicates that the largest group of low-ESG signatory funds, that is, 44.71%, employs equity-centric strategies while another 43.53% employ fixed income-centric strategies. Nonetheless, the commitment to invest responsibly for PRI signatories takes place at the firm level. By holding on to predominantly low-ESG equity securities, an investment firm reveals that it has not followed through on its promise to invest responsibly, at least when it comes to its equity portfolio, which can indeed be fully committed to ESG investment practices. Therefore, this sends a signal about *firm*-level agency problems that should also affect the non-equity-centric hedge funds managed by the firm. Consistent with this view, Panel E of Table A1 of the Online Appendix reveals that our results also extend to non-equity-centric hedge funds. Second, low-ESG signatories may disagree with the ESG assessments of data vendors like Refinitiv since there is a substantial amount of subjectivity associated with ESG assessment. Still, since the average signatory has a higher ESG score than the average nonsignatory (see Figure 3), this suggests that signatories on average agree with Refinitiv's ESG assessments. Moreover, since low-ESG signatories increase their ESG exposures once agency problems abate (see Column 4, Table VIII), it is likely that low-ESG signatories also concur with Refinitiv's ESG ratings.

Why do low-ESG nonsignatories outperform? Table III reveals that the low-ESG nonsignatory fund portfolio is the only portfolio that delivers statistically significant risk-adjusted returns. To confirm, we compare the performance of the low-ESG nonsignatory fund portfolio to that of the portfolio of all high-ESG funds. Subpanel A in Panel A of

23 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.

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Table X indicates that low-ESG nonsignatory funds outperform high-ESG funds by 2.19% (t-statistic = 3.35) after adjusting for co-variation with the Fung and Hsieh (2004) factors. To test whether this is driven by low-ESG nonsignatory funds' exposure to low-ESG stocks, we construct three factor-mimicking stock portfolios for ESG: ESG1, ESG2, and ESG3. ESG1 longs the top tercile and shorts the bottom tercile of CRSP stocks based on Refinitiv ESG ratings. ESG2 and ESG3 are the analogous portfolios that longs/shorts the top/bottom quintiles and deciles of stocks based on ESG. Subpanels B–D reveal that even after adjusting for co-variation with these factor-mimicking portfolios, the low-ESG nonsignatory fund portfolio still outperforms the high-ESG fund portfolio. Co-variation with the ESG factors only explains between 32 and 39 basis points of the 2.19% per annum spread between the low-ESG nonsignatory fund and high-ESG fund portfolios. Panel B of Table X presents results from sorts on CRSP stocks based on ESG and confirms that low-ESG stocks do not consistently outperform high-ESG stocks after adjusting for co-variation with the Carhart (1997) four-factors. Therefore, the outperformance of low-ESG nonsignatories is not driven by their underlying exposure to low-ESG stocks. Rather, their superior performance may stem from better incentive alignment. By not endorsing responsible investment, such hedge fund managers signal that they prefer to remain unconstrained by ESG motives and are unwilling to make false statements about their commitment to responsible investment.

We note that high-ESG signatories do not perform as well as low-ESG nonsignatories, even though high-ESG signatories are also unwilling to make false statements about their commitment to responsible investment. We argue that low-ESG nonsignatories are even more motivated to deliver superior performance than are high-ESG signatories, as low-ESG nonsignatories sacrifice investor flows to avoid being constrained by ESG motives while high-ESG signatories are willing to be constrained by ESG motives in return for higher investor flows.

3.7 Robustness Tests

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 in Section 3.1.

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 (2021).

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 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.

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Table X. Hedge funds and stocks sorted on ESG

In Panel A, hedge funds are sorted independently every month into 2 × 3 portfolios based on PRI endorsement and hedge fund firm ESG scores. Portfolio A is the equal-weighted portfolios of hedge funds managed by nonsignatories with bottom-tercile ESG scores. Portfolio B is the portfolio of hedge funds managed by signatories and nonsignatories 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. In subpanel A, performance is estimated relative to the Fung and Hsieh (2004) factors (FH), which are the 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 subpanels B–D, performance is estimated relative to the FH model augmented with ESG1, ESG2, and ESG3, respectively. ESG1, ESG2, and ESG3 are factor-mimicking stock portfolios for ESG that longs the top tercile, quintile, and decile of stocks and shorts the bottom tercile, quintile, and decile of stocks based on ESG, respectively. In Panel B, all CSRP stocks with market equity greater than US$1 million are sorted every year based on their Refinitiv ESG scores. Subpanels A–C report stocks sorted into terciles, quintiles, and deciles, respectively. Performance is estimated relative to the Carhart (1997) four factors, which are the market factor (MKTRF), the size factor (SMB), the value factor (HML), and the momentum factor (UMD). The *t*-statistics, derived from White (1980) standard errors, are in parentheses. The sample period is from January 2009 to April 2019. * and ** denote significance at the 5% and 1% levels, respectively.

Panel A: Hedge funds sorted on PRI endorsement and ESG

Hedge fund portfolio	Excess return (percent/year)	Alpha (percent/year)	SNPMRF	SCMLC	BD10RET	BAAMTSY	PTFSBD	PTFSFX	PTFSCOM	ESG1	ESG2	ESG3	Adj. R^2
Subpanel A: FH model													
Portfolio A (low-ESG nonsignatories)	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 B (high-ESG signatories and nonsignatories)	5.85**	−0.09	0.33**	0.03	−0.49	−2.62**	−0.01*	0.01	−0.01*				0.85
	(3.10)	(−0.12)	(14.59)	(0.91)	(−1.37)	(−4.75)	(−2.26)	(1.61)	(−2.36)				
Spread (A minus B)	2.62**	2.19**	0.03*	0.15**	0.44*	−0.43	0.01*	0.00	0.00				0.46

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Table X. Continued

Panel A: Hedge funds sorted on PRI endorsement and ESG													
Hedge fund portfolio	Excess return (percent/year)	Alpha (percent/year)	SNPMRF	SCMLC	BD10RET	BAAMTSY	PTFSBD	PTFSFX	PTFSCOM	ESG1	ESG2	ESG3	Adj. R^2
	(3.31)	(3.35)	(2.10)	(7.36)	(2.08)	(−1.32)	(2.22)	(−0.62)	(−0.81)				
Subpanel B: FH model augmented with ESG1 (longs the top and shorts the bottom tercile of stocks based on ESG)													
Portfolio A (low-ESG nonsignatories)	8.47**	1.64*	0.35**	0.08*	0.09	−2.66**	−0.01	0.01	−0.01**	−0.23**			0.90
	(3.72)	(2.25)	(14.44)	(2.35)	(0.25)	(−4.70)	(−1.35)	(1.47)	(−2.86)	(−4.77)			
Portfolio B (high-ESG signatories and nonsignatories)	5.85**	−0.23	0.32**	0.00	−0.45	−2.50**	−0.01*	0.01	−0.01*	−0.07			0.85
	(3.10)	(−0.30)	(14.99)	(−0.07)	(−1.30)	(−4.68)	(−2.54)	(1.74)	(−2.36)	(−1.31)			
Spread (A minus B)	2.62**	1.87**	0.03	0.09**	0.54*	−0.15	0.01	0.00	0.00	−0.16**			0.55
	(3.31)	(3.02)	(1.76)	(3.74)	(2.43)	(−0.50)	(1.59)	(−0.25)	(−0.69)	(−4.51)			
Subpanel C: FH model augmented with ESG2 (longs the top and shorts the bottom quintile of stocks based on ESG)													
Portfolio A (low-ESG nonsignatories)	8.47**	1.56*	0.34**	0.07	0.07	−2.60**	−0.01	0.01	−0.01**		−0.21**		0.90
	(3.72)	(2.20)	(15.04)	(1.93)	(0.20)	(−4.52)	(−1.13)	(1.45)	(−2.85)		(−5.09)		
Portfolio B (high-ESG signatories and nonsignatories)	5.85**	−0.25	0.32**	−0.01	−0.46	−2.49**	−0.01*	0.01	−0.01*		−0.06		0.85
	(3.10)	(−0.33)	(14.85)	(−0.18)	(−1.33)	(−4.61)	(−2.48)	(1.73)	(−2.33)		(−1.55)		
Spread (A minus B)	2.62**	1.81**	0.02	0.08**	0.53*	−0.11	0.01	0.00	0.00		−0.15**		0.57
	(3.31)	(2.99)	(1.47)	(3.36)	(2.41)	(−0.38)	(1.87)	(−0.27)	(−0.59)		(−5.09)		
Subpanel D: FH model augmented with ESG3 (longs the top and shorts the bottom decile of stocks based on ESG)													
Portfolio A (low-ESG nonsignatories)	8.47**	1.57*	0.34**	0.09**	0.18	−2.73**	0.00	0.01	−0.01**			−0.14**	0.89
	(3.72)	(2.09)	(14.18)	(2.65)	(0.48)	(−4.45)	(−0.77)	(1.67)	(−2.63)			(−4.81)	
Portfolio B (high-ESG	5.85**	−0.23	0.32**	0.00	−0.43	−2.54**	−0.01*	0.01	−0.01*			−0.04	0.85
	(3.10)	(−0.29)	(14.55)	(0.12)	(−1.20)	(−4.64)	(−2.37)	(1.78)	(−2.30)			(−1.18)	

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Table X. Continued

Panel A: Hedge funds sorted on PRI endorsement and ESG													
Hedge fund portfolio	Excess return (percent/year)	Alpha (percent/year)	SNPMRF	SCMLC	BD10RET	BAAMTSY	PTFSBD	PTFSFX	PTFSCOM	ESG1	ESG2	ESG3	Adj. R^2
signatories and nonsignatories)													
Spread (A minus B)	2.62**	1.80**	0.02	0.09**	0.61**	−0.19	0.01	0.00	0.00			−0.11**	0.55
	(3.31)	(2.92)	(1.41)	(4.00)	(2.79)	(−0.63)	(1.94)	(0.01)	(−0.56)			(−4.56)	

Panel B: Stocks sorted on ESG								
Stock portfolio	Sin stocks (percent)	Excess return (percent/year)	Alpha (percent/year)	MKTRF	SMB	HML	UMD	Adj. R^2
Subpanel A: Tercile sort								
Portfolio 1 (low ESG)	1.28%	19.23**	2.23	1.07**	0.63**	−0.02	−0.26**	0.95
		(3.15)	(1.59)	(35.70)	(11.77)	(−0.45)	(−5.73)	
Portfolio 2	1.13%	16.01**	0.12	1.02**	0.50**	0.04	−0.21**	0.96
		(2.84)	(0.11)	(36.68)	(10.15)	(1.02)	(−10.60)	
Portfolio 3 (high ESG)	1.15%	16.50**	1.06	1.02**	0.20**	0.04	−0.20**	0.97
		(3.20)	(1.14)	(50.52)	(6.47)	(1.41)	(−8.06)	
Spread (1 minus 3)		2.74	1.17	0.05	0.43**	−0.06	−0.06*	0.45
		(1.47)	(0.86)	(1.81)	(8.18)	(−1.23)	(−2.14)	
Subpanel B: Quintile sort								
Portfolio 1 (low ESG)	1.47%	19.67**	2.16	1.10**	0.63**	−0.07	−0.25**	0.94
		(3.19)	(1.31)	(30.27)	(10.87)	(−1.27)	(−9.14)	

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Table X. Continued

Panel B: Stocks sorted on ESG								
Stock portfolio	Sin stocks (percent)	Excess return (percent/year)	Alpha (percent/year)	MKTRF	SMB	HML	UMD	Adj. R^2
Portfolio 2	1.02%	17.89**	1.73	1.03**	0.60**	0.06	−0.26**	0.95
		(3.00)	(1.34)	(39.93)	(11.81)	(1.46)	(−4.72)	
Portfolio 3	1.04%	15.90**	−0.03	1.02**	0.51**	0.01	−0.21**	0.95
		(2.83)	(−0.02)	(31.08)	(8.88)	(0.10)	(−7.82)	
Portfolio 4	1.34%	17.44**	1.33	1.05**	0.39**	0.10*	−0.26**	0.97
		(3.03)	(1.25)	(41.71)	(10.10)	(2.52)	(−8.84)	
Portfolio 5 (high ESG)	1.07%	15.34**	0.47	0.99**	0.09**	0.01	−0.15**	0.96
		(3.21)	(0.48)	(47.28)	(2.90)	(0.21)	(−9.48)	
Spread (1 minus 5)		4.33	1.69	0.11**	0.54**	−0.08	−0.10**	0.52
		(1.83)	(0.97)	(3.12)	(9.16)	(−1.24)	(−3.75)	
Subpanel C: Decile sort								
Portfolio 1 (low ESG)	2.34%	21.42**	3.83	1.11**	0.63**	−0.03	−0.25**	0.92
		(3.37)	(1.92)	(24.13)	(9.01)	(−0.40)	(−7.63)	
Portfolio 2	0.70%	17.92**	0.49	1.09**	0.63**	−0.11*	−0.24**	0.93
		(2.93)	(0.28)	(29.07)	(10.30)	(−2.15)	(−8.36)	
Portfolio 3	1.34%	19.25**	2.76	1.03**	0.64**	0.05	−0.31**	0.93
		(3.07)	(1.69)	(29.99)	(9.78)	(0.83)	(−3.43)	
Portfolio 4	0.69%	16.52**	0.71	1.02**	0.55**	0.07	−0.21**	0.95
		(2.86)	(0.52)	(34.09)	(10.25)	(1.74)	(−7.70)	
Portfolio 5	0.61%	15.90**	−0.18	1.03**	0.57**	0.02	−0.19**	0.93
		(2.74)	(−0.12)	(23.56)	(8.10)	(0.31)	(−6.22)	
Portfolio 6	1.46%	15.90**	0.12	1.01**	0.45**	−0.01	−0.22**	0.95
		(2.89)	(0.10)	(33.56)	(8.10)	(−0.11)	(−8.47)	
Portfolio 7	1.51%	16.71**	0.70	1.04**	0.43**	0.08	−0.22**	0.96
		(2.93)	(0.58)	(33.63)	(9.81)	(1.90)	(−10.75)	

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Table X. Continued

Panel B: Stocks sorted on ESG								
Stock portfolio	Sin stocks (percent)	Excess return (percent/year)	Alpha (percent/year)	MKTRF	SMB	HML	UMD	Adj. R^2
Portfolio 8	1.19%	18.17**	1.96	1.05**	0.34**	0.12*	−0.30**	0.95
		(3.08)	(1.52)	(37.86)	(6.98)	(2.53)	(−4.93)	
Portfolio 9	1.08%	15.74**	0.95	0.98**	0.14**	0.06	−0.18**	0.94
		(3.15)	(0.75)	(37.04)	(3.20)	(1.40)	(−7.73)	
Portfolio 10 (high ESG)	1.05%	14.94**	0.00	1.00**	0.03	−0.05	−0.12**	0.96
		(3.23)	(0.00)	(41.54)	(1.04)	(−1.24)	(−6.47)	
Spread (1 minus 10)		6.47*	3.84	0.11*	0.59**	0.02	−0.14**	0.48
		(2.26)	(1.77)	(2.59)	(7.72)	(0.20)	(−3.42)	

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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 forty-one of the fund management firms in our sample. According to the PRI, fourteen firms were delisted due to merger with or acquisition by another signatory. The other twenty-seven 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. We assume that former signatories signed and delisted in the middle of the reporting period spanned by the relevant annual report in which they appear.

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 are 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 XI indicates that inferences remain unchanged after these adjustments.

Panels F–I of Table AI of the Online Appendix reveal that the baseline results are also robust to (i) excluding PRI founding signatories, (ii) analyzing style-adjusted fund performance, (iii) adjusting returns for fund termination, and (iv) 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 constraining opportunistic behavior, we expect to find weaker results for mutual funds. Nonetheless, if agency problems drive the underperformance of signatory funds, 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. 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 XII indicates that our baseline sort results also apply to mutual funds, albeit for those with poor incentive alignment. Specifically, the risk-adjusted underperformance of signatories, relative to nonsignatories, ranges from 0.50% to 1.02% per annum and is

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Table XI. Robustness tests

Hedge funds are sorted every month into two portfolios based on PRI endorsement (Columns 1 and 4) or into 2 × 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. * and ** 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 (2021) 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)

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Table XI. Continued

Panel D: Pre-fee returns				Panel K: Large investment firms			
Spread (PRI minus non-PRI)	−3.36** (−4.32)	−11.41** (−3.46)	0.30 (0.31)	Spread (PRI minus non-PRI)	−1.56* (−2.52)	−7.17** (−2.73)	0.02 (0.03)
Panel E: Excluding activist hedge funds				Panel L: Including delisted signatories			
PRI signatories	−1.74 (−1.27)	−5.45* (−2.16)	−0.99 (−0.77)	PRI signatories	−0.62 (−0.48)	−5.62* (−2.29)	0.42 (0.41)
Nonsignatories	1.06 (1.06)	2.00* (2.58)	−0.89 (−1.11)	Nonsignatories	1.40 (1.46)	2.10* (2.57)	−0.24 (−0.31)
Spread (PRI minus non-PRI)	−2.80** (−4.13)	−7.45** (−3.09)	−0.11 (−0.12)	Spread (PRI minus non-PRI)	−2.02** (−3.36)	−7.72** (−3.18)	0.66 (0.99)
Panel F: FH + ESG factor				Panel M: Pure play hedge fund firms			
PRI signatories	−1.26 (−0.99)	−5.61* (−2.26)	0.19 (0.18)	PRI signatories	−1.46 (−1.10)	−6.24* (−2.49)	0.51 (0.46)
Nonsignatories	1.18 (1.23)	1.81* (2.59)	−0.31 (−0.42)	Nonsignatories	1.25 (1.29)	2.38** (2.81)	0.28 (0.36)
Spread (PRI minus non-PRI)	−2.44** (−3.92)	−7.42** (−3.07)	0.50 (0.67)	Spread (PRI minus non-PRI)	−2.70** (−4.07)	−8.62** (−3.49)	0.23 (0.27)
Panel G: FH + Bolton and Kacperczyk (2021) carbon emissions factor				Panel N: Stock holdings from 13F + FactSet			
PRI signatories	−0.67 (−0.51)	−5.10* (−2.03)	0.52 (0.47)	PRI signatories	−1.24 (−0.97)	−4.82* (−2.04)	0.01 (0.01)
Nonsignatories	1.55 (1.60)	2.08* (2.45)	−0.01 (−0.01)	Nonsignatories	1.21 (1.26)	1.62 (1.90)	−0.95 (−1.11)
Spread (PRI minus non-PRI)	−2.23** (−3.37)	−7.18** (−2.86)	0.53 (0.71)	Spread (PRI minus non-PRI)	−2.45** (−3.93)	−6.45** (−2.84)	0.96 (1.47)

statistically significant at the 5% level for two of the three groups of mutual funds with poor incentive alignment. In contrast, for mutual funds with strong incentive alignment, signatories either outperform nonsignatories or underperform them by an amount that is statistically indistinguishable from zero. We obtain even stronger results when we compare the underperformance of low-ESG signatories versus low-ESG nonsignatories for mutual funds sorted by incentive alignment.

4. Conclusion

This paper sheds light on the investment implications of endorsing responsible investment by analyzing hedge funds. An integral part of the portfolios of responsible institutional investors, hedge funds are particularly susceptible to agency problems and prone to opportunistic behavior given their low levels of transparency, disclosure, and regulatory oversight.

We establish four main results. First, hedge funds that endorse responsible investment underperform those that do not after adjusting for risk. Signatory funds do not

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Table XII. 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 two portfolios based on PRI endorsement (Columns 1 and 4) or into 2 × 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. * and ** denote significance at the 5% and 1% levels, respectively

	Alpha (percent/year)					
	Strong incentive alignment			Weak incentive alignment		
Mutual fund portfolio	All funds (1)	Low ESG (2)	High ESG (3)	All funds (4)	Low ESG (5)	High ESG (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)

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underperform because of their greater exposure to responsible firms. Rather, the underperformance is driven by signatories with low exposure to such firms.

Second, consistent with the agency view, the underperformance of signatory (and low-ESG signatory) funds is stronger when the incentives of fund managers and investors are misaligned. Moreover, in line with the agency story, low-ESG signatories exhibit other forms of managerial opportunism. They are more likely to trigger regulatory, investment, and severe violations, and more likely to display suspicious patterns in reported fund returns that are potential indicators of fraud. To tackle endogeneity concerns, we show that following the adoption of stewardship codes, which mitigate agency problems, both the ESG exposure and relative performance of signatory funds improve. As an agency story would predict, the results are stronger for low-ESG signatory funds than for high-ESG signatory funds.

Third, hedge funds that endorse responsible investment 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 low- and high-ESG signatories. Low-ESG signatories attract investment flow by promoting their funds more aggressively and marketing to unsophisticated investors such as HNWIs who are less able to accurately assess ESG exposure.

Fourth, 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 signatories (and by low-ESG signatories, especially) underperform, suggesting that agency problems drive fund underperformance for signatory mutual funds as well.

Supplementary Material

Supplementary data are available at *Review of Finance* online.

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