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Corporate Social Responsibility

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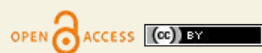OPEN ACCESS (cc) BY

Keywords

Abstract

Is shareholder interest in corporate social responsibility driven by pecuniary motives (abnormal rates of return) or nonpecuniary ones (willingness to sacrifice returns to address various firm externalities)? To answer this question, we summarize the literature by focusing on seven tests: (*a*) costs of capital, (*b*) performance of portfolios, (*c*) ownership by types of institutions, (*d*) surveys and experiments, (*e*) managerial motives, (*f*) shareholder proposals, and (*g*) firm inclusion in responsibility indices. These tests predominantly indicate that shareholders are driven by nonpecuniary motives. To stimulate further research on welfare implications for global warming, we assess whether estimates of the foregone returns for shareholders willing to reduce carbon emissions (or "greeniums"), along with the wealth pledged to firms that become sustainable, are consistent with the growth of aggregate investments in the decarbonization sector.

1. INTRODUCTION

Shareholder interest in corporate social responsibility (CSR) has dramatically increased over the past decade. Between 2012 and 2020, assets under management that account for a firm's environmental and social impact roughly tripled (**Figure 1**). Responsible investment mandates are commonly implemented through screening mechanisms that require firms to meet specific standards in order to qualify to be held in these restricted portfolios. There has also been an increase in shareholder proposals related to firm responsibility that have earned a majority of votes (**Figure 2**). While before 2015 only a few percent of such proposals passed, around 20% of proposals now do. In contrast, roughly 30% of proposals aimed at improving governance passed before 2015, whereas less than 20% now do. While these trends are no doubt correlated with rising societal concerns regarding global warming, inequality, and a host of other societal issues over this period, it is unclear what, if any, are the implications for shareholder returns.

1.1. Competing Views

There are two competing views of CSR. The first is that shareholder interest in CSR is driven by pecuniary motives. Under this telling, switching to renewable energy or employing a diverse workforce is profit maximizing in the long-run. Because of the corporate sector's short-termism or managerial behavioral biases, firms' executives may undervalue such costly expenditures and may not maximize shareholder value.[1] Capital markets might also simply be inefficient and not price in the risks of global warming, the possibility of carbon taxes, or other forms of regulation in the future.[2] According to these hypotheses, shareholders, by tilting their portfolios or actively pushing for responsible investments, are motivated by earnings growth and risk-adjusted returns.
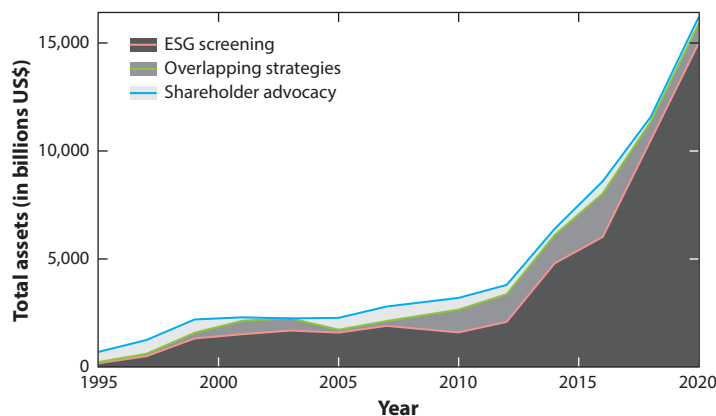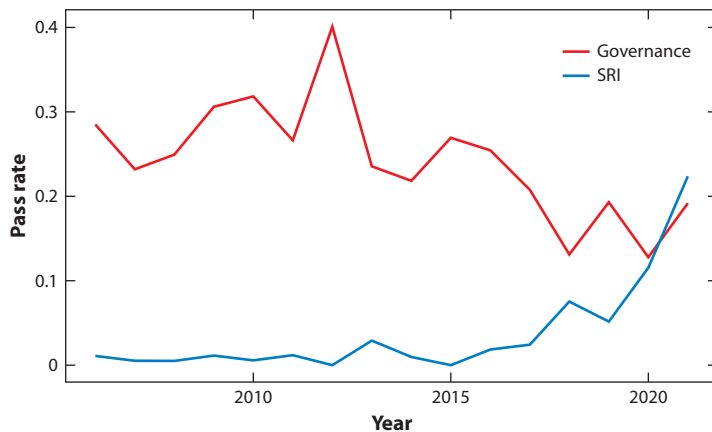

Figure 1

Trend of the scale of sustainable investing in the United States. Data are from US SIF's 2020 report. The majority of the increase in environmental, social, and governance (ESG) investing has come through ESG incorporation, or screening.

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[1]For models and discussion of short-termism, see Stein (1989, 2003). However, it should be noted that short-termism arguments for why the corporate sector has largely shunned sustainability up until now are not straightforward. As Bolton, Scheinkman & Xiong (2006) show, short-termist managers can also easily overinvest in castles-in-the-sky projects as they did during the dot-com bubble. For discussion of behavioral considerations, see Allcott, Mullainathan & Taubinsky (2014) in the context of household choice of renewables versus nonrenewables.

[2]For instance, Hong, Li & Xu (2019) find that global food companies' stock prices underreact to drought trends that significantly impact profitability.

Figure 2

Trend of the pass rate of Governance and socially responsible investing (SRI) proposals that went to a vote over time. We use data from the ISS (Institutional Shareholder Services) database (formerly known as Riskmetrics) on voting analytics of shareholder proposals to construct this figure. Specifically, we compute the number of passing proposals in a year, and divide that number by the number of proposals that went to a vote in that year, broken down by "SRI" and "Governance" labels. The proposals are labeled as either SRI or Governance by ISS.

The alternative view is that shareholder interests are primarily driven by nonpecuniary motives: They are willing to sacrifice returns to mitigate firm externalities, the benefits of which accrue to society. Under this view, responsible or sustainable finance addresses the global-warming externalities or other societal concerns by influencing firms' costs of capital, thereby incentivizing value-maximizing firms to reform. These initiatives are an extension of socially responsible investing practices from an earlier generation that were rooted in religious or ethical considerations. That is, brown stocks are the new sin stocks (Hong & Kacperczyk 2009) that investors shun despite being highly profitable enterprises. These nonpecuniary motives might emanate from household prosocial preferences (Bénabou & Tirole 2010). Or, more likely, they are regulatory in nature, with examples being the Glasgow Financial Alliance for Net-Zero for asset managers and the Network for Greening of the Financial System for banks.[3] Regardless, shareholder interest in CSR is meant to incentivize the private provision of public goods.

The pecuniary view is associated with the marketing of ESG (environmental, social, and governance) investing for equities such as by the largest asset management company Blackrock. The nonpecuniary view is associated with the issuance of green bonds, where the term greenium refers to the pricing benefits based on investors' willingness to pay (WTP) extra or accept lower yields in exchange for sustainable impact.[4] Indeed, one of our goals is to assess whether there is a responsible firm premium for the weighted average cost of capital (WACC) of firms.

1.2. Equilibrium Perspective

Fortunately, there has also been a surge in academic research among financial economists on this central issue in recent years. For this review, we selected published papers in top journals or

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[3]For instance, many papers have shown that "country-of-origin" and "internationalization" of firms matter for CSR. For example, Liang & Renneboog (2017) find that firms in countries with legal systems more friendly to stakeholders as opposed to outside shareholders have higher responsibility scores. Cai, Pan & Statman (2016) find a similar result. Boubakri et al. (2016) show that CSR increases after cross-listing.

[4]For an early book on the rise of ESG, see Landier & Nair (2009).

working papers that have garnered significant citations and categorized them based on different types of empirical tests.[5] Much of our categorization is guided by equilibrium models of value-maximizing firms and shareholders who, for nonpecuniary reasons, restrict their portfolios to holdings that meet certain social responsibility criteria (i.e., sustainable finance mandates). When stocks are imperfect substitutes, investor demand for stocks with responsible attributes would naturally drive up the prices of those stocks and, hence, drive down their required rates of return.[6] But to understand equilibrium outcomes, we need to factor in the response of value-maximizing firms (Heinkel, Kraus & Zechner 2001).

If stocks of responsible firms have higher prices, nonresponsible firms will be motivated to pay mitigation or adaptation costs in order to qualify to be held by investors who restrict their holdings to responsible firms. For instance, utilities can sell off their coal businesses and, hence, qualify to be held by green portfolios just as hotels can sell off their casinos to qualify for ethical portfolios.

In a dynamic stochastic general equilibrium model with costly adjustment of capital and optimal firm choice over time of whether to be responsible or not, the difference in the required rates of return for responsible versus irresponsible firms (assuming similar firm productivity and risks) is given by (Hong, Wang & Yang 2023)

$$r^S - r^U = -m/q,$$ 1.

where r^S is the required rate of return for responsible or sustainable firms, r^U is the required rate of return for the irresponsible or unsustainable firms, m is the firm spending on mitigating externalities (as a fraction of firm capital) in order to qualify to be held by responsible investors, and q is Tobin's q or price of firm capital.

Tobin's q is equalized across responsible and irresponsible firms precisely because value-maximizing firms have to be indifferent between being responsible and not in equilibrium. m can be investments in decarbonization capital like renewables, direct air capture projects (e.g., plants, start-ups) or other types of flow spending to mitigate other firm externalities. The difference in the costs of capital in Equation 1 can be interpreted as the dividend yield that investors in responsible firms are sacrificing in order to incentivize firms to be responsible. In contrast, under a pecuniary view, we expect either no cost of capital difference or a positive difference since proponents of responsible investing often argue that responsible firms ought to outperform irresponsible firms.

1.3. Tests

Beyond being helpful to organize the empirical literature, we frame our review around sustainable finance mandates because they can lead to outcomes close to the planner's first-best solution, depending on the fraction of shareholders that are responsible and their willingness to sacrifice returns (Hong, Wang & Yang 2023).[7] Below, we summarize this cost of capital test along with six other tests. Under the nonpecuniary view, the following results should be true:

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[5] For other recent reviews on investor interest in CSR, see Heal (2005), Matos (2020), and Gillan, Koch & Starks (2021).

[6] All else being equal, nonpecuniary tastes lead to negative risk-adjusted expected returns in a CAPM setting (or negative alphas; Pástor, Stambaugh & Taylor 2021), though there are potentially offsetting factors depending on assumptions about informational efficiency (Pedersen, Fitzgibbons & Pomorski 2021).

[7] However, Broccardo, Hart & Zingales (2020) show that under certain circumstances activist voting policies are welfare improving relative to implementing screening mandates. Contracting frictions between shareholders and executives could also limit the effectiveness of shareholder responsibility mandates (Davies & Van Wesep 2018). Furthermore, there are a number of other theories exploring how complementarities, externalities, and contracting frictions can make CSR arrangements socially optimal (Besley & Ghatak 2007; Magill, Quinzii & Rochet 2015; Chowdhry, Davies & Waters 2019; Oehmke & Opp 2022).

1. Costs of capital: A responsible firm's cost of capital (or required rate of return) is lower than that of its irresponsible counterpart.

2. Performance of portfolios: Responsible shareholders' portfolios underperform those of irresponsible shareholders.

3. Ownership by types of institution: norm-constrained institutions, like endowments, are more likely to invest in responsible stocks compared to unconstrained institutions like hedge funds.

4. Surveys and experiments: Responsible investors are motivated not just by profits but also philanthropic, ethical, or other nonpecuniary motivations.

5. Managerial motives: Managers or insiders with nonpecuniary motives do good with other people's money.

6. Shareholder proposals: Goals expressed in governance and responsibility proposals are in conflict.

7. Inclusion in responsible stocks indices: no effects if markets anticipate firms have to spend to mitigate externalities in order to get into and stay in the indices.

Tests 1 through 4 follow from the discussion of Equation 1. Test 5 pertains to whether managerial nonpecuniary motives might lead to an overinvestment in CSR that comes at the expense of shareholder welfare (Friedman 1970). Test 6 relates to concerns on the possible conflicts between governance and CSR (Tirole 2001). Test 7 on inclusion of firms into responsible indices highlights the competing effects that offset each other when a firm gets included: (*a*) a decrease in dividend yield due to firm spending on mitigation of externalities and (*b*) a decrease in the firm's cost of capital.

1.4. Summary of Findings in Literature

Empirical analyses based on these tests typically measure firm responsibility using data from commercial providers such as MSCI-KLD. These data often include measures of a firm's governance (i.e., whether the practices of the firm are friendly to shareholders) that were developed during the early 2000s as part of the Enron debacles and governance crisis in corporate America.

As we detail below, there are of course identification concerns with each of these tests when it comes to estimating the implications of firm responsibility for shareholder returns. For instance, responsible stocks tend to be growth stocks as opposed to value stocks, which needs to be accounted for.[8] Indeed, virtually all studies use a variety of factor models such as those by Fama & French (1992), which Bansal, Kiku & Ochoa (2019) argue pick up long-run risks related to climate change. Nonetheless, concerns about omitted risk factors are always present since firms that are financially healthy and viable are more likely to be socially responsible in the first place (Hong, Kubik & Scheinkman 2012). Furthermore, responsibility ratings of firms can differ across data vendors,[9] leading to concerns of measurement errors. Furthermore, there are good profit reasons for firm responsibility[10] but the question is whether shareholder interest in CSR on the margin is motivated by pecuniary or nonpecuniary reasons.

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[8]The following papers show that Tobin's q is correlated with CSR attributes: Servaes & Tamayo (2013), Albuquerque, Koskinen & Zhang (2019), Jiao (2010), and Bhandari & Javakhadze (2017).

[9]For instance, studies generally find that there is more consistency in ratings for environmental performance than social performance (Chatterji et al. 2016; Berg, Kölbel & Rigobon 2022).

[10]For instance, companies strategically use philanthropy for lobbying (Bertrand et al. 2020) and nonwage benefits like maternal leave to attract talented female workers (Liu et al. 2022). Hong et al. (2019) show that CSR is valuable for firms when they get in trouble with regulators using violations of the Foreign Corrupt
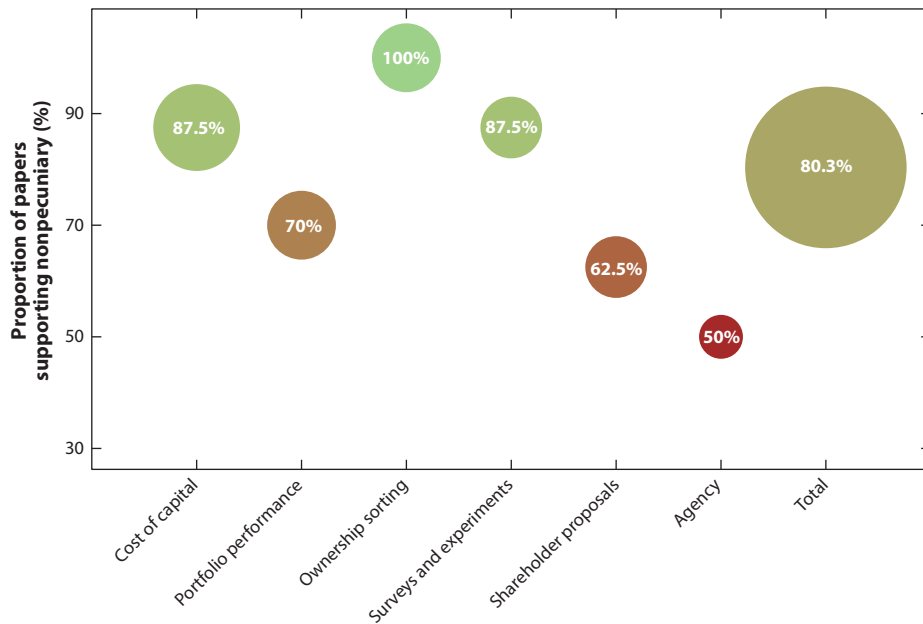
Figure 3

This bubble plot shows the proportion of papers that we review that support the nonpecuniary view. The proportion is represented numerically and along a color scale (*brown* to *green*). The size of the bubble corresponds to the number of papers included in calculating the percentage. The papers we include in this plot are all those presented in **Tables 1–6** in Section 2. In those tables, we present papers as either confirming or rejecting a key positive question related to pecuniary versus nonpecuniary benefits. If a paper is "unclear" on the answer to that question, then we assign this as a rejection of that question. We exclude papers from **Table 7** in this figure, as findings from index inclusion tests are difficult to interpret; we discuss this in Section 2.7. In total, there are 56 papers that go into the production of this plot.

Despite these issues and the fact that studies are from different periods and use different types of data to measure firm responsibility, we find that studies generally support the nonpecuniary view. For the most part, the reasoning for this conclusion is straightforward: It is based on the fraction of studies for each test that supports either view (see our bubble plot in **Figure 3**). For five of the seven tests, the majority of the papers support the nonpecuniary view. Empirical studies of Test 7 on inclusion into responsible stock indices are difficult to interpret as we explain in Section 2.7. They are excluded from **Figure 3**. Overall, 80.3% of the papers are consistent with the nonpecuniary view.

1.5. New Analyses

There are two further aspects of our review worth mentioning. Test 6 on shareholder proposals is unsettled. As we demonstrated in **Figure 2**, responsibility proposals are much more likely to pass after 2015, but there are no papers using data after 2015. Hence, we conduct an empirical analysis using recent data. Finally, we propose new directions for further research that are motivated by an exercise that connects estimates of greeniums and of wealth pledged to net-zero mandates with the growth of aggregate investments in decarbonization.

Practices Act. Family firms that provide implicit unemployment insurance outperform (Sraer & Thesmar 2007; Ellul, Pagano & Schivardi 2018).

2. CATEGORIZING LITERATURE INTO SEVEN TESTS

2.1. Costs of Capital

The first test is on whether socially responsible firms have a lower cost of capital (i.e., a lower required rate of return) compared to irresponsible firms. Studies typically compare the risk-adjusted stock returns of responsible to irresponsible firms.[11] Under the nonpecuniary view, socially responsible firms have a lower required rate of return since shareholders are willing to pay higher prices for such firms because they mitigate externalities.

In **Table 1**, we summarize the leading recent studies that test Equation 1. We classify these studies into stock and bond market tests. For stock market tests, there are two types of dependent variables to proxy for the firm's expected return: (*a*) the realized return of the stock and (*b*) the implied cost of capital, which is the required rate of return inferred using a model of earnings and comparing the present value of these predicted earnings with the stock price. For bond market tests, the two dependent variables used are excess returns and bond yield spread.

These various dependent variables are regressed on measures of firm responsibility, including controversial businesses, scores of a firm's responsibility, and firm carbon emissions. The main identification concern is that irresponsible firms are riskier than responsible firms. There are a number of ways to address this concern, including using risk factor models or controlling for various firm characteristics. Studies also generally control for other firm observables, i.e., purge out as much heterogeneity as possible so as to test Equation 1. One crucial issue with measuring expected returns in contrast to volatility is the critical need for a large sample size in the time dimension (Merton 1980).

Many studies are limited by the lack of time-series data on the responsibility scores, which only became available starting in 1990. Nonetheless, almost all studies generally find a coefficient consistent with Equation 1 and the nonpecuniary motive. The longest sample is the Hong & Kacperczyk (2009) study of sin stocks from 1926 to 2006. Adjusting for risk factors including size, value, and momentum, a portfolio of sin stocks outperforms its industry comparables by around 3% annually.

The most recent study on green stocks from Pástor, Stambaugh & Taylor (2022), measured with MSCI environmental scores and using the implied cost of capital method, finds a cost of capital wedge between green and brown stocks equal to −1.5%.[12] A study by Khan, Serafeim & Yoon (2016) is the exception among the papers in finding a large positive risk-adjusted return for sustainable firms, which the authors, using auxiliary data from SASB, attribute to selected components of ESG scores that investors care about.

However, studies on carbon emissions [a good example is that by Bolton & Kacperczyk (2020)], which are arguably the one component of ESG scores that most institutional investors care about, find negative risk-adjusted returns for sustainable firms. The caveat is that there have to be industry controls in the panel regression analysis. Over the recent sample period of 2009–2020, low carbon intensity companies are technology firms that have outperformed due to concurrent

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[11]Several papers also assess the cost of capital indirectly: Cheng, Ioannou & Serafeim (2014) test whether KZ capital constraint scores (Kaplan & Zingales 1997) move with CSR; Jiraporn et al. (2014) assess the impact of CSR on the credit ratings of firms; and Houston & Shan (2022) show that banks are more likely to grant loans to borrowers with similar ESG profiles.

[12]There are also a number of studies that examine how the performance of these two groups of stocks varies over time, such as with the business cycle (Bansal, Wu & Yaron 2022), market crises (Nofsinger & Varma 2014; Lins, Servaes & Tamayo 2017; Buchanan, Cao & Chen 2018), COVID-19 (Albuquerque et al. 2020, Bae et al. 2021, Broadstock et al. 2021, Ding et al. 2021), and weather episodes (Choi, Gao & Jiang 2020). However, it is difficult to draw key inferences regarding our central question since business cycles can encompass different types of underlying shocks.

Table 1 Do responsible firms have a lower cost of capital?[a]

Paper	Dependent variable	Regressor	Coverage	Years of data	Cost differential
Stocks					
Hong & Kacperczyk (2009)	Monthly returns	Sin stock dummy (α)	NYSE, Amex, and Nasdaq stocks	1926–2006	−3.5%
El Ghoul et al. (2011)	Expected returns/ implied cost of capital	MSCI-KLD scores	2,809 US firms	1992–2007	−0.1%
Chava (2014)	Expected returns/ implied cost of capital	MSCI Environment scores	S&P 500 & Russell 2000	1992–2007	−0.7% to −1.4%
Oestreich & Tsiakas (2015)	Portfolio alpha	"Dirty versus Clean" by carbon emissions	65 German firms	2003–2009	−1.4%
Bolton & Kacperczyk (2020)	Monthly returns	Carbon emissions	14,400 firms, 77 countries	2005–2018	−2.3% to −4.5%
Görgen et al. (2020)	Yearly returns	Constructed "Brown-Green Score"	26,664 US stocks	2010–2017	−6.8%
Bolton & Kacperczyk (2021)	Monthly returns	Carbon emissions	3,421 US companies	2005–2017	−1.5% to −3.6%
Hsu, Li & Tsou (2022)	Monthly returns	Carbon emission intensity	379 US firms	1991–2016	−4.4%
Pástor, Stambaugh & Taylor (2022)	Monthly returns	MSCI environment scores and climate news shocks	MSCI-KLD universe (∼2,000 US firms)	2012–2020	−1.4%
Khan, Serafeim & Yoon (2016)	Monthly returns	MSCI-KLD scores interacted with SASB "materiality" scores	2,396 US firms	1991–2013	4.8% to 6.5%
Bonds and banks					
Goss & Roberts (2011)	Bank loan spreads	MSCI-KLD scores	3,996 loans to US firms	1991–2006	−0.07% to −0.18%
Baker et al. (2018)	Green bond yield spread to conventional bonds	CBI certified green bond indicator	2,083 green bonds	2010–2016	−0.06%
Zerbib (2019)	Green bond premium to otherwise identical conventional bond	Bond liquidity differential	110 green bond– conventional bond pairs	2013–2017	−0.02%
Huynh & Xia (2021)	Future bond excess returns (risk-free)	WSJ Climate Change News Index	8,231 US bonds	2002–2016	−0.06%
Seltzer, Starks & Zhu (2022)	Bond yield spread	Sustainalytics environmental scores and carbon emissions	4,235 bonds	2009–2017	−0.13%
Larcker & Watts (2020)	Green bond spread to otherwise identical conventional bond	Bloomberg certified green bond indicator	640 green bond– conventional bond pairs	2010–2016	0%

[a]Here, we collect recent papers that estimate differences in the cost of capital for responsible versus nonresponsible firms using both stocks and bonds. We include the key dependent variable and regressor, the coverage, the years of the data, and the size of the average annual cost of capital differential of "responsible" firms compared to "nonresponsible" firms. Note that this means that a negative number implies a lower cost of capital for responsible firms, consistent with Equation 1. If the regressor is not binary, we indicate the cost of capital wedge for one standard deviation in the regressor. If the regressor is binary, we simply report the coefficient. In some cases, several estimates are offered in the paper. In those cases, we offer the range reported.

digital trends in the economy that are arguably orthogonal to climate concerns (Zhang 2022). Of course concurrent digital trends also make identification of greeniums challenging.

Finally, it is worth noting that studies using bonds also typically find a responsibility premium, consistent with investor WTP to induce firms to address externalities. Concerns about omitted risk factors that pervade equity studies are arguably less of an issue for debt by virtue of the finite duration of the cash flows of bonds.

2.2. Performance of Portfolios

Under the nonpecuniary motive, responsible portfolios should underperform irresponsible portfolios. The reason is that shareholders of responsible firms are giving up extra dividend yield in order to finance mitigation externalities.[13] Under the pecuniary motive, responsible portfolios should outperform irresponsible portfolios. **Table 2** reports the results from studies that conduct

Table 2   How do responsible investors perform relative to nonresponsible investors?[a]

Paper	Dependent variable	Portfolio type	Coverage	Years of data	Annual return equivalent
Hong & Kostovetsky (2012)	Fund returns and portfolio alpha	Mutual funds	2,100 managers	1992–2006	−1.3%
Hartzmark & Sussman (2019)	Excess returns	SRI mutual funds	>20,000 mutual funds	2016–2017	−5.9%
Barber, Morse & Yasuda (2021)	Internal rate of return	Dual-objective VC funds	159 impact funds	1995–2014	−4.7%
Geczy, Stambaugh & Levin (2021)	Certainty equivalence loss from optimal portfolios	SRI mutual funds	894 mutual funds	1992–2007	−3.6%
Hwang, Titman & Wang (2021)	Future returns	SRI ownership revelation	3,100 US firms	2003–2016	−4.4%
Liang, Sun & Teo (2021)	Portfolio alpha	Hedge fund PRI signatories	307 hedge fund companies	2006–2019	−2.45%
Avramov et al. (2022)	Portfolio alpha	ESG score and score uncertainty	NYSE/AMEX/Nasdaq common stocks with share codes 10 or 11	2002–2019	−3.8%
Deng, Kang & Low (2013)	Cumulative abnormal returns	High CSR acquisitions	1,556 mergers by 801 US firms	1992–2007	3.6%
Dimson, Karakaş & Li (2015)	Abnormal returns	CSR engagements	613 US firms	1999–2009	1.8%
Verheyden, Eccles & Feiner (2016)	Portfolio alpha	"Global all" ESG screened	~85% of global equities	2010–2015	0.3%

[a]Here, we collect recent papers that look at the performance of high CSR/low CSR portfolios. We include the key dependent variable, the portfolio type, the coverage, the years of the data, and the annual return equivalent of the portfolio where possible. Note that a negative return implies that responsible portfolios underperform relative to nonresponsible portfolios.

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[13]Hong, Wang & Yang (2023) show that there is an equivalence between having a representative household restrict a fraction of its wealth to firms that meet responsibility mandates and having some households be responsible investors and others irresponsible investors. Ultimately, socially responsible investors sacrifice consumption in order to fund mitigation on behalf of society. Hence, such a responsible mandate can be stable over time, assuming responsible households' WTP does fall over time.

such a test. The dependent variable is typically portfolio alpha, i.e., risk-adjusted returns.[14] The literature has considered a variety of related dependent variables. The concerns regarding the length of the time series and identification that we stated for cost of capital wedge tests apply to portfolio performance tests.

These caveats notwithstanding, studies generally find that responsible portfolios underperform irresponsible portfolios, consistent with the nonpecuniary motive. Barber, Morse & Yasuda (2021) find that venture capital funds with dual objectives of profit and impact underperform other funds. Hartzmark & Sussman (2019) find socially responsible funds underperform using a novel natural experiment with Morningstar ratings. Hwang, Titman & Wang (2021) find that stocks with concentrated ownership among ESG funds underperform.

One of the exceptions in the literature that finds outperformance is Dimson, Karakaş & Li (2015), who study a sample of activist funds. One explanation for this difference, proposed by Gollier & Pouget (2014), is that activist funds earn excess returns by reforming brown firms with low valuations to green firms with high valuations and selling them to the market.[15] As we noted in **Figure 1**, activist funds tend to be the minority in the responsible investment landscape. Furthermore, the sample of activist funds might be selected since only activist funds with good performance might report their results. Hence, we conclude from **Table 2** that the typical responsible portfolios generally underperform irresponsible ones.

2.3. Ownership by Types of Institutions

Under the nonpecuniary view, one hypothesis is that certain types of institutions such as pension plans and universities should be more sensitive to social norms compared with hedge funds that are largely pecuniary motivated. **Table 3** reports studies that have directly conducted this test.[16] Hong & Kacperczyk (2009) find pension plans and university endowments are more likely to screen out sin stocks from their portfolio than mutual funds or hedge funds. These findings have been shown out of sample—for instance, Dyck et al. (2019) find that hedge funds are much more likely to own brown stocks. Similarly, stocks with state ownership are more likely to be in higher ESG stocks.[17]

2.4. Surveys and Experiments

The fourth set of studies uses surveys and experiments to solicit shareholder WTP for corporate mitigation of externalities. Those we survey can be found in **Table 4**. One important point these papers make is that the response of subjects depends on how the surveys and experiments are framed. Papers generally find that nonpecuniary factors are important determinants of investor behavior. In their survey of institutional investors, Krueger, Sautner & Starks (2020) find that the highest level of support is split across three motives: the protection of the investors' reputations,

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[14]Some papers assess alternative measures of performance: Auer & Schuhmacher (2016) look at the Sharpe Ratios of high versus low ESG portfolios and find evidence for a negative premium, especially in the United States, and Hoepner et al. (2021) look at the effect of CSR engagements by investors on portfolio downside risk, finding that engagements are associated with subsequent reductions in downside risk.

[15]These results are of a similar vein to firm acquisitions based on CSR being value enhancing.

[16]Several papers identify that "long-term" investors gravitate toward high CSR stocks. The definition of "long-term" is typically related to the churn of stock ownership and is a feature tightly associated with pension funds/college endowments in particular (Gloßner 2019). As such, we label these results as consistent with more direct measures of "norm-constrained" ownership sorting.

[17]In the United States, values related to climate change often sort on political dimensions. Hong & Kostovetsky (2012) find that fund managers that donate to Democratic political candidates in federal elections have much more responsible portfolios than fund managers who donate to Republican candidates in these elections.

Table 3 Is there positive sorting of norm-constrained institutions into responsible stocks?[a]

Paper	CSR rating	Coverage	Years of data	Investor	Yes/no
Hong & Kacperczyk (2009)	Sin stock dummy (α)	NYSE, Amex, and Nasdaq stocks	1926–2006	Banks/insurance/pension funds/mutual funds/hedge funds	Yes
Fernando, Sharfman & Uysal (2017)	MSCI-KLD scores	KLD universe	1997–2007	Hedge funds, pension funds, college funds	Yes
Starks, Venkat & Zhu (2017)	MSCI-KLD scores	166,185 obs	2000–2017	Long-term/short-term	Yes
Boubakri et al. (2019)	ASSET4 ESG scores	18,816 obs, 41 countries	2002–2014	State ownership	Yes
Dyck et al. (2019)	ASSET4 ESG scores	3,277 firms, 44 countries	2004–2013	Hedge funds and pension funds	Yes
Gloßner (2019)	MSCI-KLD scores	5,302 US firms	1991–2013	Long-term/short-term	Yes
Nofsinger, Sulaeman & Varma (2019)	MSCI-KLD scores	Russell 1000	2001–2013	Long-term/short-term	Yes
Chen, Dong & Lin (2020)	MSCI-KLD scores	1,632 obs	2003–2006	Pension funds/college	Yes
Hsu, Liang & Matos (2021)	ASSET4 ESG scores	3,902 firms, 44 countries	2004–2017	State ownership	Yes
Dai, Liang & Ng (2021)	ASSET4 ESG scores	34,117 unique customer-supplier pairs, 50 countries	1991–2006	SR customer	Yes

[a]Here, we collect recent papers that look at how investor type influences portfolio construction. We include the CSR rating employed, the coverage, the years of the data, the investor type, and whether the paper shows that norm-constrained investors tilt toward responsible stocks (Yes) or not (No).

their moral/ethical considerations, and their legal/fiduciary duties. Bauer, Ruof & Smeets (2021) collect two field surveys of members of a pension fund and find that two-thirds are willing to expand the funds' engagements with companies based on their sustainable development goals, even when they expect that engagement to harm financial performance.

A couple of papers have sought to establish investor preference more directly. Riedl & Smeets (2017) conduct an incentivized experiment to establish social preferences in investors, then link the responses to administrative data on portfolio holdings. They find that "social preferences" and "social signaling" explain SRI decisions, with financial motives being less important. Heeb et al. (2022) perform a framed field experiment on investors to estimate the WTP for sustainable investments. They find that the average WTP for the sustainable investment is 4.57% (€45.67 on a €1,000 investment).

2.5. Managerial Motives

The fifth set of tests correlates firm responsibility characteristics with agency problems in the firm. Under the nonpecuniary view, responsibility emanates from agency problems with insiders (Friedman 1970). Under the pecuniary view, firms with fewer agency problems should be more responsible. Studies in this literature generally support the nonpecuniary view though the results are less unanimous compared to earlier tests; see **Table 5** for the list of papers surveyed. For instance, Di Giuli & Kostovetsky (2014) find that firms with Democratic CEOs are more likely to implement CSR, and that these policies lead to lower returns. However, Ferrell, Liang & Renneboog (2016) find, using standard proxies for agency concerns, that firms with fewer agency concerns have higher responsibility scores. To address identification issues with cross-sectional comparisons, Cheng, Hong & Shue (2023) use the 2003 Dividend Tax Cut, which increased after-tax

Table 4 Are moral, ethical, or environmental considerations a top three factor in portfolio decisions?[a]

Panel A: Surveys					
Paper	**Topic**	**Respondent profile**	**No. of respondents**	**Years of data**	**Yes/no**
Bauer, Ruof & Smeets (2021)	Willingness to pay (binary) for sustainable investing	Pension funds	~4,800 respondents	2018	Yes
Rangan, Chase & Karim (2015)	Purpose of CSR programs	Firm managers	142 managers	2011–2015	Yes
Amel-Zadeh & Serafeim (2018)	Why and how investors use ESG	Institutional investors	652 respondents	2016	Yes
Krueger, Sautner & Starks (2020)	Attitudes to climate change and risk	Institutional investors	439 respondents	2017–2018	Yes
Stroebel & Wurgler (2021)	Climate finance and risks	Academics, professionals, public sector workers	861 respondents	2021	Unclear
Panel B: Experiments					
Paper	**Dependent variable**	**Participants**	**Coverage**	**Years of data**	**Yes/no**
Riedl & Smeets (2017)	Expectation of returns for SRI funds	Private investors	3,254 respondents	2011	Yes
Heeb et al. (2022)	Willingness to pay for sustainable investing	Private investors	527 investors	2020	Yes
Elliott et al. (2013)	Firm valuation and CSR info	Business school students	88 participants	2010	Yes

[a]Here, we collect recent papers that employ surveys and experiments to uncover investor motivations for holding socially responsible investments. For surveys, we include the survey "topic," respondent profile, number of respondents, years in which the surveys were conducted, and whether they find that investors are motivated by moral, ethical, or environmental considerations (Yes) or not (No). For experimental evidence, we include the key dependent variable, participant type, coverage, years of the data, and whether they find that participants are motivated by moral, ethical, or environmental considerations (Yes) or not (No); we also indicate if the paper's findings are mixed (Unclear).

Table 5 Are managers doing good with other people's money?[a]

Paper	**CSR measure**	**Agency feature**	**Coverage**	**Years of data**	**Yes/no**
Cheng, Hong & Shue (2023)	MSCI-KLD Scores	Dividend Tax Cut	S&P 500	1991–2006	Yes
Borghesi, Houston & Naranjo (2014)	MSCI-KLD Scores	Media Attention on Firm/CEO	11,711 observations, US firms	1992–2006	Yes
Di Giuli & Kostovetsky (2014)	MSCI-KLD Scores	Democratic versus Republican Founders/CEOs/Directors	Russell 3000	2003–2009	Yes
Masulis & Reza (2015)	Corporate Giving	Dividend Tax Cut	Fortune 500	1996–2006	Yes
Cronqvist & Yu (2017)	MSCI-KLD Scores	CEO Has Daughters	S&P 500	1992–2012	Yes
Jiraporn & Chintrakarn (2013)	MSCI-KLD Scores	CEO Power (CEO Pay Slice)	1,370 US firms	1995–2007	Unclear
El Ghoul et al. (2016)	ASSET4 ESG Scores	Family Control Dummy	335 firms, 94 family firms, 9 countries	2002–2011	Unclear
Ferrell, Liang & Renneboog (2016)	MSCI-KLD Scores	Agency Concern Proxies	91,373 observations, 59 countries	1999–2011	No

[a]Here, we collect recent papers that look at whether agency concerns explain CSR performance. We include the CSR measure, the agency feature, the coverage, the years of the data, and whether the paper finds that the agency feature explains (Yes) or doesn't explain (No) the CSR performance; we also indicate if the paper's findings are mixed (Unclear).

Table 6 Do shareholder proposals create firm value?[a]

Paper	Dependent variable	Proposal type	Coverage	Years of data	Yes/no
Cheng, Hong & Shue (2023)	MSCI-KLD scores	Governance	1,062 governance proposals	1991–2006	No
Grewal, Serafeim & Yoon (2016)	Tobin's q	SRI proposals	2,665 ES proposals	1999–2013	Unclear
Flammer (2015)	Cumulative abnormal returns	SRI proposals	61–122 "just-pass" proposals	1997–2012	Yes
Cao, Liang & Zhan (2019)	Cumulative abnormal returns	SRI proposals	"Just-pass" number not reported	1997–2011	Yes

[a]Here, we collect recent papers that look at the impact of shareholder proposals, both "governance" and "SRI" proposals. We include the key dependent variable, the proposal type, the coverage, the years of the data, and whether they find that proposals increase (Yes) or decrease (No) firm value; we also indicate if the paper's findings are mixed (Unclear).

insider ownership, to find evidence in favor of the marginal dollar of CSR spending being related to agency problems. Masulis & Reza (2015) have a similar finding for philanthropic spending in particular.

2.6. Shareholder Proposals

The literature has also examined the effects of the passage of these proposals on various firm outcomes. These studies are summarized in **Table 6**.[18] The evidence based on the shareholder proposals test is ambiguous. A widely used empirical approach is a quasi-experiment research design that involves comparing outcomes for subjects that just barely meet a threshold or cutoff for treatment with outcomes for subjects that just barely missed this cutoff.

Flammer (2015) finds, using a regression discontinuity design (RDD) for votes around the 50% or majority threshold, that passage of responsibility proposals leads to higher firm value, which is consistent with the pecuniary view. Using a similar RDD, Cheng, Hong & Shue (2023) find that passage of governance proposals has a negative effect on firm responsibility scores. Their sample overlaps with Cuñat, Giné & Guadalupe (2016), who previously used the design to show that passage of governance votes leads to higher firm value. These findings are consistent with the nonpecuniary view of firm responsibility.

One reason why these studies differ is that regression discontinuity strategies require lots of data around thresholds. In the early sample, there are not many close votes when it comes to responsibility as opposed to governance proposals (as we documented in **Figure 2**). The literature has not examined the recent couple of years when there are many more close votes when it comes to responsibility proposals. This is why we reevaluate these questions using more recent data in Section 3.

2.7. Responsible Stocks Index Inclusion Tests and Other Event Studies

There have been a fair number of studies investigating the stock price effects of firm inclusion into stock market indices based on a firm's responsibility scores. These studies are summarized in

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[18]Other recent papers have also explored how firm or investor status influences behavior around shareholder proposals. For example, Chen, Dong & Lin (2020) show that firms included in the Russell 1000 index subsequently face more CSR proposals, a result they argue is driven by an influx of institutional investors. Similarly, Dikolli et al. (2022) show that mutual funds with "SRI" status are more likely to vote in support of ESG shareholder proposals. However, as in the rest of this article, the focus of this section is on whether these proposals result in pecuniary or nonpecuniary firm outcomes.

Table 7   Does inclusion in a socially responsible index increase firm value?[a]

Paper	Measure of firm value	Index	Coverage	Years of data	Yes/no
Hawn, Chatterji & Mitchell (2018)	Cumulative abnormal returns	DJSI World Index	408 additions, 272 deletions, 27 countries	1999–2015	No
Berk & van Binsbergen (2021)	Monthly returns	FTSE4Good USA	411 additions, 385 deletions	2002–2020	No
Robinson, Kleffner & Bertels (2011)	Cumulative abnormal returns	DJSI World Index	48 additions, 43 deletions, North America	2003–2007	Yes
Edmans (2011)	Portfolio alpha	"100 best companies" Index	US stock market	1984–2009	Yes

[a]Here, we collect recent papers that look at inclusion to socially responsible indices as an identification strategy. We include the measure of firm value, the "index" in question, the coverage, the years of the data, and whether they find that the inclusion improved (Yes) or decreased (No) firm value.

Table 7. Though some early studies with limited inclusion events find positive effects of inclusion, recent studies with the largest sample of inclusion events generally find no price effects.

However, these studies are difficult to interpret when it comes to whether they support or reject the nonpecuniary view. Firms that get selected into these indices are nonrandom. To the extent firms have made costly pledges to enter these indices, the overall price effect depends on the size of the foregone dividend yield due to firm spending on mitigation of externalities versus a decrease in the firm's cost of capital from nonpecuniary preferences. In other words, one needs data on the cost of pledges to separate discount rate effects from cash flow effects. There are related tests in the literature connected to news about a firm's responsibility ratings[19] and disclosure requirements that might be useful to tease out these competing channels.[20]

3. RECENT SAMPLE SHAREHOLDER PROPOSALS

As noted in the introduction, since 2015 there has been a notable upward trend in the proportion of SRI proposals that have passed shareholder votes. However, much of these data have not been covered in the literature. To address this problem, we examine a recent sample of shareholder proposals and test whether the passage of SRI proposals impacts firm value, and whether Governance proposals impact CSR performance.

3.1. Data

We obtain data on shareholder proposals from 2006–2021 from ISS, formerly known as Riskmetrics. ISS covers all S&P 1500 firms, plus an additional 400–500 widely held companies. The database includes information on proposal type, content, vote share, and sponsor, the date of the annual meeting, and firm identifiers. Crucially, ISS denotes whether a proposal was an "SRI" proposal or a "Governance" proposal. We match these data with three additional databases: CRSP for stock returns data, Compustat for firm-level fundamentals, and MSCI-KLD for firm-level "ESG" scores. We use the sum of ESG strengths minus the sum of ESG concerns as our measure of ESG. In our final sample, we have 13,343 proposals from 1,393 unique firms. Of those proposals, 8,072 are Governance proposals, and 5,271 are SRI proposals.

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[19]News tests include Krüger (2015), Grewal, Riedl & Serafeim (2019), Capelle-Blancard & Petit (2019), Flammer (2013), Tang & Zhang (2020), and Flammer (2021).
[20]Disclosure tests include Flammer, Toffel & Viswanathan (2021), Xie et al. (2019), Dhaliwal et al. (2011), and Cahan et al. (2016).

3.2. CSR Proposals and Firm Value

To test the impact of SRI proposals on firm value, we implement an RDD. We first compare the abnormal returns on the day of the vote of firms that just passed SRI proposals versus the abnormal returns of firms that just failed to pass SRI proposals.[21] We calculate the abnormal returns using a Carhart (1997) four-factor model. To implement the RDD, we restrict attention to thresholds around the pass requirement of a given proposal; here, we mirror Flammer (2015) by looking at 10%, 5%, 2.5%, and 1.5% thresholds. An estimate for the impact of passing the shareholder proposal is then established by running the following regression on the restricted set of observations within the threshold, where we test for differences in the means either side of the cutoff:

$$AR_{i,t} = \beta_0 + \beta_1 pass_{i,t} + \epsilon_{i,t}, \qquad \qquad 2.$$

where $AR_{i,t}$ is the abnormal returns of firm i on day t, and $pass_{i,t}$ is a dummy variable taking a value of 1 if the firm faced an SRI proposal that passed in that day's meeting. If β_1 is statistically greater than 0, then we conclude that the passing of the SRI proposal had a positive effect on firm value, at least at the local level.

Although this procedure is consistent, it leads to the elimination of a significant number of observations and, hence, suffers from potential loss of efficiency. To address this problem, we implement a strategy based on that by Lee & Lemieux (2010) and allow for polynomials on either side of the cutoff:

$$AR_{i,t} = \alpha_y + \phi_s + \beta_0 + \beta_1 pass_{i,t} + P_l(v_{i,t}, \gamma_l) + P_r(v_{i,t}, \gamma_r) + \epsilon_{i,t}, \qquad \qquad 3.$$

where α_y is a year fixed effect, ϕ_s is an industry fixed effect, $v_{i,t}$ is the vote share of the proposal, and $P_j(v_{i,t}, \gamma_j)$ is a polynomial to the left ($j = l$) or right ($j = r$) of the cutoff. The introduction of two polynomials is in effect an attempt to approximate the continuous relationship between abnormal returns and vote share, with β_1 then capturing any discontinuous jump around the cutoff. We report results for polynomials of order 2, 3, and 4. In both cases, we cluster standard errors by firm, and control for a number of firm-level variables (Return on Assets, Return on Equity, Tobin's q, Market Value, Employee Productivity, and Net Profit Margin).

Table 8 shows the results. We fail to find a positive effect of just passing an SRI proposal on abnormal returns across the eight specifications, with some evidence that the effect is negative in the quadratic polynomial case.[22]

Our results differ from those of Flammer (2015) and Cao, Liang & Zhan (2019). There are at least two reasons why this might be the case. First, we focus on larger firms by restricting ourselves to the ISS database.[23] Second, we look at a different sample period: 2006–2021 rather than 1997–2012. This choice is motivated by the increase in the number of passing SRI proposals in the years since 2012. Looking exclusively at ISS data, we find 71 SRI proposals that pass between 2006 and

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[21]As Lee (2008) shows, as long as there is a random component to the vote, even if that component is small, then the assignment to treatment and control groups is random around the threshold. Listokin (2008) shows that vote shares of management sponsored proposals may be manipulated, but suggests that the vote shares of shareholder sponsored proposals (i.e., the proposals we implement in our design) are not subject to the same manipulation.

[22]In an extension, we also construct a plot of the victory margin of SRI proposals and abnormal returns on the day of the vote as a sense check. We collect proposals at 2% bins on the victory margin and take the arithmetic mean of abnormal returns within that bin. We fit two polynomials on the order of 3 around the cutoff. Again, we fail to find evidence of a positive effect of just passing an SRI proposal on abnormal returns.

[23]Flammer (2015) and Cao, Liang & Zhan (2019) also include data from Factset's "Sharkrepellent" database that covers 4,000 firms in the Russell 3000 from 2005 to 2012.

Table 8   This table presents regressions of abnormal returns on the day of the proposal vote, calculated using a Carhart (1997) four-factor model, on a dummy variable, _Pass_, that takes a value of 1 if the proposal is passed, and 0 otherwise[a]

Dependent variable:	Abnormal returns							
Threshold/ polynomial:	All votes	±10%	±5%	±2.5%	±1.5%	Quadratic	Cubic	Quartic
Model:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables								
Pass	0.0004	−0.0021	0.0049	−0.0016	0.0031	−0.0226*	0.0796	0.3113
	(0.0028)	(0.0052)	(0.0088)	(0.0084)	(0.0100)	(0.0134)	(0.0498)	(0.2454)
Year						Yes	Yes	Yes
Industry						Yes	Yes	Yes
Firm controls						Yes	Yes	Yes
Fit statistics								
Observations	2,320	166	61	30	15	2,198	2,198	2,198
R^2	1.28×10^{-5}	0.00057	0.00476	0.00126	0.00731	0.17500	0.17799	0.17850
Within R^2						0.00903	0.01262	0.01324

Significant codes: ***, 0.01; **, 0.05; *, 0.1.

[a]The proposals considered are those ISS labels such as "SRI" that went to a vote. Column (1) estimates the specification in Equation 2, applied to the entire sample. Columns (2)–(5) also estimate the specification in Equation 2, but are restricted to observations within 10%, 5%, 2.5%, and 1.5% of the cutoff, respectively. Columns (6)–(8) estimate the specification in Equation 3 and implement a quadratic, cubic, and quartic polynomial, respectively. Standard errors are reported in parentheses, clustered at the firm level.

2021, and 17 between 1997 and 2011. Regardless of the reason, the lack of a return effect of the passage of a CSR proposal is consistent with the null result when a stock is added to a responsible stocks index—the numerator effect (costly implementation of proposals) and the denominator effect (lower costs of capital as a result) offset each other.

3.3. Governance Proposals and MSCI-KLD

To test whether governance proposals reduce ESG scores as found by Cheng, Hong & Shue (2023), we implement the same methodology as above, substituting the change in ESG score in the year subsequent to the passing of the proposal for abnormal returns ($\Delta ESG_{t+1} = ESG_{t+1} - ESG_t$), and focusing on governance rather than SRI proposals. As in the analysis of SRI proposals on abnormal returns, we also control for a number of firm-level variables when we implement the polynomial method as used by Lee & Lemieux (2010). Results can be found in **Table 9**. We find evidence that governance proposals lower ESG scores, with the polynomial method yielding statistically and economically significant results for the change in ESG ratings. Recall that our score measures the net of ESG strengths and concerns as identified by MSCI-KLD: Just passing a Governance proposal lowers net scores by as much as 1.5. This corresponds to a 0.77 standard deviation drop in the overall score. In other words, the adverse impact of governance proposals on ESG scores found by Cheng, Hong & Shue (2023) using data on governance proposals from 1997–2011 holds up when we update the sample to 2021.

4. FUTURE RESEARCH: GREENIUMS AND INVESTMENTS IN DECARBONIZATION

Finally, we assess the range of estimates of greeniums as captured by differences (risk-adjusted) in costs of capital for green versus brown firms. In **Figure 4**, we construct a binned kernel density

Table 9 This table presents regressions of the change in the ESG score in the year subsequent to the proposal vote on a dummy variable, *Pass*, that takes a value of 1 if the proposal is passed, and 0 otherwise[a]

Dependent variable:	ΔESG_{t+1}							
Threshold/ polynomial:	All votes	±10%	±5%	±2.5%	±1.5%	Quadratic	Cubic	Quartic
Model:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables								
Pass	−0.0922**	−0.1180*	−0.0676	−0.1604	−0.1130	−1.522**	−1.484***	−1.340***
	(0.0405)	(0.0709)	(0.1053)	(0.1490)	(0.1984)	(0.6549)	(0.4649)	(0.4588)
Fixed effects								
Year						Yes	Yes	Yes
Industry						Yes	Yes	Yes
Firm controls						Yes	Yes	Yes
Fit statistics								
Observations	4,869	1,203	567	316	207	4,377	4,377	4,377
R^2	0.00131	0.00254	0.00082	0.00480	0.00253	0.16270	0.16283	0.16292
Within R^2						0.00796	0.00812	0.00822

Significant codes: ***, 0.01; **, 0.05; *, 0.1.

[a]The ESG score is calculated as the sum of the ESG strengths minus the sum of ESG concerns as reported by MSCI. The proposals considered are those ISS labels such as "GOV" that went to a vote. Column (1) estimates the specification in Equation 2, applied to the entire sample. Columns (2)–(5) also estimate the specification in Equation 2, but are restricted to observations within 10%, 5%, 2.5%, and 1.5% of the cutoff, respectively. Columns (6)–(8) estimate the specification in Equation 3, and implement a quadratic, cubic, and quartic polynomial, respectively; we also control for firm and year fixed effects in columns (6)–(8). Standard errors are reported in parentheses, clustered at the firm level (by PERMNO).

Abbreviation: ESG, environmental, social, and governance investing.
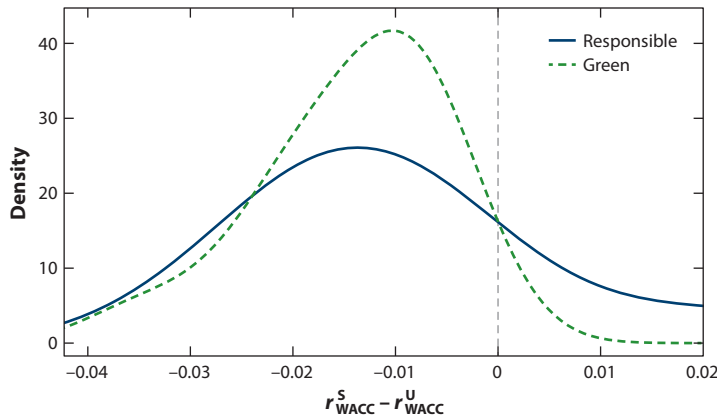
Figure 4

This figure shows a binned kernel density estimate of the size of the weighted average cost of capital (WACC) premium achieved by "sustainable" versus "unsustainable" firms, i.e., $r^S - r^U$ as in Equation 1. We calculate the WACC premium using the equity return premia estimates provided in the papers documented in **Tables 1** and **2**, and the median bond/bank premium in **Table 1** of −6 basis points. We use a debt-to-equity ratio of 1, consistent with data from Statista on the ratio of total debt to equity in the United States. To account for the debt tax shield, we use the pre-2017 corporate tax rate of 35%, as this is the rate in place across the vast majority of the samples. We also show the distribution of a subset of equity premia that deal directly with the "greenium." The methods used to identify all these premia vary, though typically involve estimating some risk-adjusted return difference.
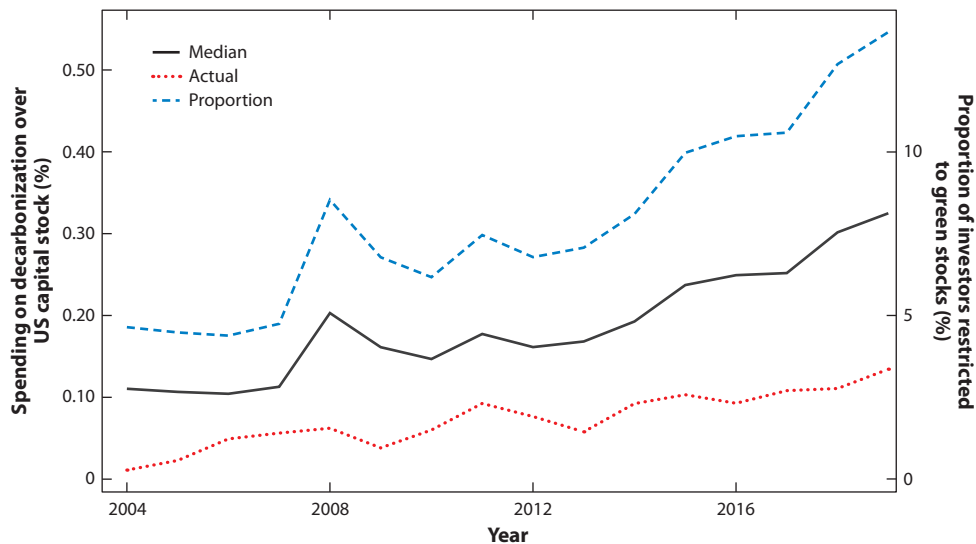
Figure 5

Using the model described by Hong, Wang & Yang (2023), and the median weighted average cost of capital (WACC) greenium shown in **Figure 4**, we construct predicted US decarbonization investment spending (*black solid line*). We compare these predictions to actual data on spending (*red dotted line*). These two series are plotted on the left vertical axis. The data for the actual spending come from BloombergNEF's Energy Transition Investment Trends 2022 Report, and the data for the US capital stock come from FRED. We also plot the actual proportion of US investors restricted to green stocks (*blue dashed line*) on the right vertical axis. We construct this value by calculating the sum of the assets under management (AUM) restricted to green activities in the United States divided by the market capitalization of the US stock market. The data for the AUM restricted to green activities come from US SIF's 2020 report, and the data for the market cap of the US stock market come from Siblis Research.

of the difference in the WACC for green minus brown firms based on the estimates from papers in **Tables 1** and **2** that focused on firm environmental impact. The mean of the distribution is −1.41% with a standard deviation of 0.86%.

We also include the distribution of the estimates for the returns shareholders are willing to sacrifice for all sustainable finance mandates, i.e., all papers covered in **Tables 1** and **2**. The means of the two distributions are comparable, though the standard deviation of the overall responsible distribution is greater than the green distribution.

Using Hong, Wang & Yang (2023), we can confront the estimates of the greenium to the growth of green mandates and investments in the decarbonization sector. Since we observe Tobin's q, we can map these estimates using Equation 1 to back out how much each firm spends as a fraction of capital m on investments in decarbonization capital. Using **Figure 1**, we can back out the fraction of assets restricted to green firms in that year, α_t. Aggregate investment in decarbonization in each year t is m multiplied by α_t.

In **Figure 5**, we plot from 2004 to 2020 the value of α_t. We also plot the yearly predicted aggregate investment based on a greenium of −1.19%, the median estimate of the cost of capital difference in **Figure 4**. This estimate generates a value for mitigation that is too large relative to actual investments in decarbonization. There are at least five potential reasons for why the predicted decarbonization path is too large and each is worth future research.

First, as we have already discussed, better identification strategies are needed to estimate the WTP of households. Second, the BloombergNEF data do not necessarily capture all corporate

investments into the decarbonization space. Better measures of these investments, at both the firm level and the aggregate level, are needed.

Third, there can potentially be greenwashing, and investors might not fully understand what they are getting. Fourth, as Broccardo, Hart & Zingales (2020) point out (also in Heinkel, Kraus & Zechner 2001), idiosyncratic risk can lead to a less than one for one mapping from WTP to actual investments. It would be interesting to quantify these compositional effects.

Fifth, investors might derive utility in the form of warm glow, emphasized by Pástor, Stambaugh & Taylor (2021), as opposed to purely consequential aims. Hence, the spending on actual climate change mitigation is a lower bound on what the firm spends to maximize investors' warm glow. Other types of spending such as advertising or other forms of signaling ought to then be included in m.

Hence, our exercise points to the need to corroborate future research on measuring greeniums with data on levels of actual mitigation spending for firms to qualify as green, as in recent papers.[24] These same comments apply to estimating responsibility premiums related to other types of firm externalities or concerns beyond carbon emissions. An emphasis on the real effects of net-zero mandates, particularly in the power sector, would contribute significantly to the emerging field of climate finance (Hong, Karolyi & Scheinkman 2020) since much of it is still focused on hedging and pricing of climate risks as opposed to how financial markets contribute to the mitigation of climate risks.

5. CONCLUSION

Is the recent and dramatic rise in shareholder interest in CSR driven by investors' nonpecuniary motives, i.e., shareholders seeking to do good, or by firms' maximization of returns? Based on equilibrium models featuring firm choice to be responsible or not, we categorize the recent financial literature into seven tests to distinguish between these two alternative hypotheses. We also extend the literature by including recent data on shareholder proposals regarding firm responsibility. We find that the literature generally finds evidence consistent with the hypothesis that shareholders are driven by nonpecuniary motives. Confronting literature estimates of firm responsibility premiums or greeniums in the context of global warming, we point to the need for future research that incorporates measures of corporate investments in the decarbonization sector.

DISCLOSURE STATEMENT

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[24]For example, Naaraayanan, Sachdeva & Sharma (2020) show that environmental activist investors reduce plant-level chemical emissions through increased capital expenditures on new abatement initiatives; Chu & Zhao (2019) find that hedge fund activism also reduces plant-level emissions through investments in pollution-reducing technologies; and Choi et al. (2022) show that high emission firms invest more in green patents, suggesting that these firms invest in projects that make them more environmentally friendly. By contrast, Akey & Appel (2019) show that hedge fund activism reduces pollution, but argue that this is achieved through reduced production, not abatement.

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