Sustainable Investments: Return and Risk

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Empirical evidence shows that investors and institutions are interested in socially responsible and sustainable investments due to either their values for making a positive impact on the society or because of the perceived rewards and less downside risk of such investments. In addition, a country's rule of law, culture, values and norms help promote socially desirable and sustainable investments. Furthermore, money flow appears to be larger for firms with high environmental, social and governance scores. Studies generally show a lower cost of capital for socially responsive firms and perhaps a better corporate value. This is due, in part, to lower risk premium demanded by investors. A survey shows that potential investors rank the environment the highest, 79 percent, followed by products with a rank of 48 percent, among other socially desired goals.

Keywords: sustainable investments, return, risk

INTRODUCTION

Muller (2009) explains that the earth atmosphere is composed of water and carbon dioxide and helps maintain a portion of the sunlight heat. While a certain amount of carbon dioxide on the earth atmosphere is good and needed to work well for this pattern, excessive amounts of it are hazardous to earth. He further notes that the amount of carbon dioxide on the earth atmosphere until the 1800s has been 280 ppm (parts per million), but it has risen to about 380 ppm, an increase of about 35 percent within the past two centuries. This increase in the atmospheric carbon dioxide appears to cause higher than normal reflection of infrared radiation to earth, leading to greater than normal temperature on earth.

It appears that there is a role for individuals and institutions in limiting the rise in pollution, mitigating global warming, and minimizing the rise in global temperature and minimizing atmospheric disorder. One way of doing so would be for investors to pursue environmentally healthy investments, also known as sustainable investments, to make an impact or mitigate and reduce the rise in temperature and help maintain an orderly life on earth. These may include, but are not limited to, investments in renewable energy, clean water, safeguarding the nature, and limiting pollution. By directing capital towards such healthy investment projects, the goal is to limit the flow of capital towards environmentally hazardous projects. Sustainable and environmentally friendly investments may also be motivated to increase the monetary value and manage or reduce risk. Starks (2023) explores the role of values and value in sustainable finance.

Financial theory helps in this process. For decades, maximizing wealth to common equity holders has been used as a theoretical and sound approach to analyzing corporate decisions. In practice, this translates to managing the firm for the best interests of stockholders. Herbert Simon (1947) provided a theoretical framework for "satisficing," rather than maximizing stockholders utility of wealth. A business enterprise

may, and should, have additional objectives besides maximizing interests of its stockholders. This may include providing healthcare and other benefits to employees, safeguarding the environment, and avoiding the use of child labor, among other things. Outside of the legal requirements and regulations, a business enterprise may pursue these goals for various reasons: social recognition, and corporate responsibility; and expectation that perhaps doing good may lead to doing well.

Graham (2022), by analyzing the survey of CFOs during 2019 and 2020 finds, among other things, support for a satisficing approach to corporate management. He concludes that: a) governance and internal control mechanisms have a focus on stakeholders as compared to shareholders; and b) managerial forecasts result in unusual negative and positive surprises, and corporate managers adhere to conservative actions to reduce the downside risk. These findings appear to help the growth of environmental investments due to their lower downside risk and limiting the chance of large litigation losses.

Hartzmark and Abigail (2019), show causal evidence regarding investors' preference for sustainability. They survey investors and find that the environment ranks the highest, 79 percent; followed by products with a rank of 48 percent; and human rights ranking 32 percent; community ranks 32 percent; diversity 26 percent; employee relations 23 percent; and corporate governance has a rank of 22 percent. Thus, environment and products were with the highest ranking. This survey was done in March 2016 when Morningstar Mutual Funds Survey had initiated its sustainability ratings on mutual funds, where a 5-globe denoted the highest sustainability rank and the 1-globe, the lowest.

They consider the initiation of environmental score measure for firms by Morningstar as a large "quasi exogenous" shock as mutual funds hold about 40 percent of market capitalization of the NYSE portfolio. This relationship between the Morningstar ranking and the flow of money to the newly ranked mutual funds is causal. Hartzmark and Abigail (2019) found that mutual funds with a 5-globe, or the highest sustainability rank, experienced $24 billion in net money inflows, while those with the lowest, 1-globe rank, were with a net money outflow of $12 billion. Data are for the period March 2016-January 2017. The net money flow ratio to each mutual fund's size is used for consistency. During March 2016- Jan 2017, the overall average net money flow for all mutual funds was -0.4 percent per month; this was -0.9 percent for 1-globe and near zero for the 5-globe. This implies that investors pursued their values in investing in environmentally friendly companies. After Morningstar globe ranking, the highest sustainability funds received money inflows of 4 percent of fund size during the next 11 months. In contrast, it was a money outflow of 6 percent for the lowest sustainable funds. This empirical evidence shows the role of values versus value as in Stark (2023) regarding socially responsible investments.

Gilan, Sekerci, and Starks (2022) find that firms with more influential shareholders respond more strongly to investors' demand for investing in environmental and socially responsive projects, this is further reinforced by Bialkowski, Starks and Wagner (2022) explaining that this is due to the growth in institutional-fund portfolio allocation to such investments. In addition, Dyck, Lins, Roth and Wagner (2019) show the influence of institutional investors in enhancing the growth of environmental and sustainable investments.

Values Versus Value

Value investors, looking for the maximum return for a given level of risk, may be attracted for environmentally friendly investments for its limited downside risk and for mitigating the risk of payments of damages and facing large lawsuits. In this view, the environmentally friendly investments may be on high demand by value-based investors, thereby bidding up the price of common stock of such firms. Values-based investors, on the other hand, pursue goals other than maximizing return.

Laura Starks (2023) in her Presidential Address to the American Finance Association, provides much information on sustainable finance; environmental, social, and governance (ESG); socially responsible investments (SRI); and corporate social responsibility (CSR). She further searches for motivation and objectives of investors and corporate managers for sustainable investments as to whether it is due to their "values" or looking for "value." The values-based motivation for sustainable investments may be due to preferences such as religious values, for fairness, or exclusion of investments in certain industries or products, searching for non-monetary rewards and reaching socially desired goals. Impact investing aims

to exclude firms based on values, known as negative screening, while positive screening searches for companies that reflect investors' values, desires, and beliefs.

Starks (2023) shows that while U.S. mutual funds are much larger than the European funds in terms of assets under management, the European funds are the largest in ESG investing. In particular, she notes that the Yale index of country-level environmental performance has a coefficient of 0.59 with the S&P 500 environmental scores by country, indicating the impact of country and regional differences and governmental policies. This is in line with Cai, Pan, and Statman (2016) showing that country factors such as per capita income, the legal system, and culture are affecting ESG consideration in investing. Stark (2023) sorts the S&P 500 common stock index into ESG quartiles based on their scores in Morningstar, and finds that the higher ranked ESG corporations show an increasing weight in mutual funds' portfolio asset allocation during 2013-2023. She shows a decomposition of the S&P 500 index of common stock into ESG ranking by Morningstar, implying that investors have been interested in such investments. Riedel and Smeets (2017) show that the primary motivation to invest in SRI funds is the social factor.

Liang and Renneboog (2017) examine the role of a country's legal origin, civil law or common law, on its corporate social responsibility. In a civil law regime, there are coded rules and regulations that apply in corporate governance and the laws control corporate behavior, and protecting stakeholders' rights. The common law places less emphasis on coded rules and regulations, favors decisions based on the norms and precedence for protecting the shareholders, and enables courts to resolve conflicts of interest. Thereby, the country's cultural norm and origin or nature of a country's laws, are important factors affecting sustainability and corporate social responsibility.

Liang, and Renneboog (2017) use international data bases on corporate social responsibility for 25000 large publicly traded firms across 114 countries and 123 industries, including "engagement as well as compliance" data on environment and social issues, during 1999-2014. CRS ratings (AAA to CCC; 6 to zero) are taken from Morgan Stanley Industrial's Intangible Value Assessment, in which labor relations, carbon risk, and environmental opportunity highly influence the global CRS rankings. They further use risk metrics EcoValue 21 and Risk Metrics Social Ratings, which include environmental and social issues. They also use Vigeo's database on corporate ESG ratings and Thomson Reuter's ASSET4ESG ratings. Their research methodology includes non-parametric Wilcoxson rank-sum test, OLS, random effects GLS, and random effects probit models. The independent variables included were: legal origin of the country; political institutions; block-holder ownership; firm size; ROA; Tobin's Q ratio; the ratio of market to book value of assets; log of GDP per capita; and block-holder ownership who own more than 5 percent of total shares of the company.

Liang and Renneboog (2017) identify the country's legal origin as the main factor for the strength of its corporate social responsibility, noting that the civil law countries have the strongest corporate social responsibility ratings as compared to the common law countries.

RETURN AND RISK

In regards to performance of ESG investing, Starks (2023) states that it depends on whether the influencing factor in such investments is value or values. Values-based investors usually set aside certain industries or companies because of negative screening. As this is a constraint on investments, the expected return may be lower if the excluded investments perform well. This aligns with Geczy, Stambaugh, and Levin (2021). Values investors may not have expectations of high or maximum returns due to negative screening. At the same time, investments that are based on sound environmental, and social investments may lead to reduction of the overall risk. Starks, Venkat, and Zhu (2022) find that long term investors tend to invest in higher rated ESG stocks and Kruger, Sautner, and Starks (2020) find that three factors influencing investors decisions are financial: improving returns; reduction in risk; and reduction in the tail risk or large losses.

Pedersen, Fitzgibbons, and Pomorski (2021) provide a theoretical framework for an ESG-adjusted capital asset pricing model, and an ESG-efficient frontier. They further provide empirical evidence by calculating the Sharpe ratio for each ESG level. Using the ESG scores on the horizontal axis and the Sharpe

ratio on the vertical axis, they find the ESG efficient frontier showing the relationship between ESG scores and the Sharpe ratio. They then derive the level of the ESG score at which the Sharpe ratio is at its maximum. This is the investment opportunity set when an investor cares about the mix of return, risk, and ESG.

The ESG-Sharpe efficient frontier depends only on the firm's characteristics and is independent from an investor's preferences. Pedersen, Fitzgibbons, and Pomorski (2021) will then show that investors will choose from among return-risk-ESG adjusted portfolios according to their utility preference ordering. By plotting the risk measured as standard deviation on the horizontal axis, and return on the vertical axis, when both the ESG efficient frontier and the unconstrained mean-variance efficient portfolios are included, the tangency portfolio with ESG scores is to the right and below the unconstrained efficient frontier. This implies a lower return and higher standard deviation for the ESG efficient portfolios, yielding a lower Sharpe ratio than the unconstrained portfolio. That is, the unconstrained efficient portfolio dominates the ESG-efficient frontier.

Investors aware of ESG will choose the highest ESG-Sharpe ratio, and those with the high motivation for ESG will choose an efficient ESG portfolio with a higher ESG but lower Sharpe ratio. Therefore, the ESG-Sharpe ratio efficient frontier provides the various optimal investment portfolios for investors to choose from according to their utility preference ordering.

Performance Measurement

Appraisal of performance of environmentally healthy investments depends on the motivation for such investments: values-based; or value-based, as Starks (2023) explained. In regards to return on investment, values-based investors usually set aside certain industries and companies limiting the resulting return. Therefore, the expected return may be lower if the non-allowed investments perform well. Further, short sale in the negatively screened investments is prohibited, limiting expected return if the negatively screened investment does poorly.

Climent, and Soriano (2011) study the performance of environmental mutual funds during 1987-2009, with a sub-period of 2001-2009. The time horizon includes the "Great Recession" of 2008-2009. During 1987-2009, the green funds showed 8.45% in annual return with a standard deviation of 17.56 percent as compared with conventional funds: 12.67 percent return and standard deviation of 15.05 percent, and green funds declined heavily in 2008 by 55.61 percent. Thus, in terms of this data, return-risk performance of the green funds was sub-optimal during 1987-2009. They use the Jensen's alpha to measure performance in a one-factor and four-factor models. The one-factor model is shown in equation (1).

$$R_t - R_{ft} = a + b\left(R_{mt} - R_{ft}\right) + e_t \tag{1}$$

where "a" is the one-factor adjusted return performance of the portfolio, alpha. In a one-factor model, alpha is negative for green (-3.20 percent), and negative for SRI (-1.53 percent) but positive (1.02 percent) for conventional funds, implying a lower risk-adjusted excess return for the green funds as compared to the conventional funds during 1987-2009.

The four-factor model in Climent, and Soriano (2011) includes size (SMB), investment style (HML), and momentum (MOM). They compare performance of green, SRI, and conventional funds as well as "difference" portfolios of green versus SRI and green versus conventional. In a one-factor model, the proxy for the market factor is S&P 500, while for the four-factor model, the market proxy is the CRSP value-weighted portfolio. SMB measures the differential return between small-cap and large-cap stock; HML denotes the differential return between growth and value; and the momentum, MOM, is measured as the difference in return between a prior year winner portfolio and a prior last year loser portfolio. As shown in Table 1, the alpha as a measure of performance for green funds is (-3.96), for SRI (-1.82), and for conventional (0.01). This shows a lower performance of green funds as compared to the conventional funds in terms of alpha as a measure of excess risk-adjusted return during 1987-2009. The market betas are: 0.97 for green funds, 0.85 for SRI, and 0.93 for conventional funds. Performance of "difference" portfolio of green versus conventional is negative (-3.96). SMB betas are 0.36 for green, 0.02 for SRI, and 0.14 for

conventional. HML betas are: 0.19 for green; 0.08 for SRI; and 0.18 for conventional. MOM betas are: -0.04 for green; -0.01 for SRI, and 0.003 for conventional funds. As noted by the authors, green funds are heavily exposed to small cap stocks.

TABLE 1
RESULTS FOR THE FOUR-FACTOR MODEL, 1987-2009

Investments	Alpha	Beta for Market	Beta for SMB	Beta for HML	Beta for MOM
Green Funds	-3.96	0.97	0.36	0.19	-0.04
SRI Funds	-1.82	0.85	0.02	0.08	-0.01
Conventional	0.01	0.93	0.14	0.18	0.003

Climent, and Soriano (2011) further find that green funds did somewhat better during 2001-2009 as compared to 1987-2009. Due to limits imposed on green funds in asset selection, their performance are expected to be lower than non-constrained funds. Overall, during 2001-2009, green fund's risk adjusted excess return was not different from the SRI and conventional funds.

Ibikunle and Steffen (2015) analyze performance of European environmental-friendly mutual funds, referred to as the "green funds." Mutual funds that include the firms engaged in coal and oil production are referred to as the "black funds." unconstrained funds are referred to as the unconditional funds. Data are during 1991-2014. The "green firms" are characterized as those involved in the production of natural resources, clean technology, renewable energy, and with low impact on environment. In contrast, a "black firm" is defined as one involved in the production of carbon-intensive production, depletion of natural resources, and mining. This includes the full industrial process from the production to the refining phase. Their data include 175 green, 259 black, and 976 conventional funds. The methodology is based on the one, three, and four-factor asset pricing models. Data are monthly during January 1991-June 2014.

Ibikunle and Steffen (2015) use the Thomson Reuters-Eikon fund screener for ethical funds, and continue to adjust it to reach a sub-sample of green funds based on publicly available documents on individual mutual funds. This results in 175 active or liquidated and merged green funds, 113 of which are across 21 countries. In the same manner, they find 259 active or liquidated, and merged black funds, 150 of which are operating. The screening for the conventional funds results in 976 active, liquidated and merged funds, 586 of which are operating. Monthly differences in return between the funds and the risk-free rate is regressed onto the one-factor and four-factor models. The four-factor model includes the market, SMB, HML, and MOM. Benchmarks other than the market include FTSE Global Small Cap index, S&P Alternative Energy index, and S&P Global Natural Resources index. The four-factor model is shown as in equation (2).

$$R_{it} - R_{ft} = a_i + b_{i\,mkt}\left(R_{mkt} - R_{ft}\right) + b_{i\,smb}(R_{smbt}) + b_{i\,hml}(R_{hmlt}) + b_{i\,mom}(R_{momt}) + e_{it} \qquad (2)$$

$R_{it} - R_{ft}$ Denotes excess return on a mutual fund (i) over the risk-free return (f) as measured by one month Treasury bill return.

a_i Denotes a measure of excess return or "alpha." For good performance alpha should be greater than zero. It is a measure of relative performance to the four-factor portfolio.

$R_{mt} - R_{ft}$ Denotes risk premium on the market portfolio (m) over risk free asset (f).

SMB_t Denotes the influence of company size. Small cap stocks are those below the median market capitalization stocks. It is the return spread between small cap and large cap portfolios.

HML_t Denotes high versus low book to market value representing value vs. growth stocks, respectively, based on the median stock. It is the difference in return between a value and a growth portfolio.

(MOM_t) Denotes a measure of stock price momentum in the market. It is the difference in return between a portfolio of past 12 months winners and a portfolio of past 12 months losers.

t Denotes month.

TABLE 2
FOUR-FACTOR MODEL RESULTS, JANUARY 1991-JUNE 2014

Investments	Alpha	$Beta_{mkt}$	$Beta_{smb}$	$Beta_{hml}$	$Beta_{mom}$	R^2
1. Green	-7.46	1.15	0.38	-0.09	0.03	0.74
2. Black	-4.0	1.05	0.41	0.20	0.11	0.57
3. Conventional	-3.4	1.08	0.08	0.03	0.02	0.65

TABLE 3
FOUR-FACTOR MODEL RESULTS, 2003-2014

Investments	Alpha	$Beta_{mkt}$	$Beta_{smb}$	$Beta_{hml}$	$Beta_{mom}$	R^2
1. Green	-7.41	1.20	0.36	-0.23	0.05	0.76
2. Black	-3.86	1.19	0.34	-0.52	0.12	0.65
3. Conventional	-3.49	1.13	-0.05	-0.08	0.00	0.72

As shown in Tables 2, and 3, Green funds appear to be exposed to small cap and growth stocks, while black funds are exposed to the value stocks. Overall, green mutual funds underperformed relative to conventional funds, but risk adjusted return differences are not statistically different for comparison of green versus black funds.

Firms that are in the production and transportation of hazardous materials appear to be more likely subject to fines and payment of damages. In addition, demand for such investments may decline and their prices may fall far below the equilibrium level. Potential investors may require a large risk premium for hazardous investments. Luo and Balvers (2017) provide theoretical and empirical evidence on abnormal risk premium of "sin" stocks denoted as investments boycotted by investors driven by socially desired investment motives. They show that the abnormal premium is due to the preference to take the systematic risk of socially responsible investments compared to the "sin" stocks. Common equity of firms in the alcohol, coal, and tobacco are classified as the boycotted or "sin" stocks during 1963-2012. They show that the abnormal risk premium of boycotted stocks is systematic and independent of legal risk, neglected stock effect, illiquidity, and industry concentration. They use a two-factor asset pricing model as shown in equation (3). The excess return of an asset, R_i, is determined by its beta to the market risk factors, b_{im}, and its beta to boycott factor, $b_{ib.}$

$$R_i = a_i + b_{im} R_m + b_{ib} R_b \quad (3)$$

As shown in equation (3) the required return on a boycotted stock includes rewards for two systematic risks: risk due to the market as measured by b_{im}; and the extra systematic risk due to the hazardous nature of the investment type, b_{ib}.

The boycott portfolio includes a long position of sin stocks and a short position in hedged portfolio of non-sin stocks. This two-factor efficient frontier is formed by all portfolios consisting of boycotted (B) and market portfolios (M), including optimal portfolios of unrestricted and restricted stocks.

In line with this, Hisu, Li and Tsou (2023) find that risk premium is higher for the highly polluting firms as they are more exposed to environmental regulation. They constructed a long-short portfolio of high and low industrial pollution, and show a 4.42 percent average annual return during 1991-2016. Their

methodology includes a stage one in which they construct proxies for firm-level pollution and their relation with stock returns in a cross-sectional analysis. In the second stage, they examine possible factors affecting the return-pollution relations. Data are taken from Capital IQ on pollution litigation, the Enforcement and Compliance History Online (ECHO), and Toxic Release Inventory (TRI) database from the Environmental Protection Agency.

By measuring a firm's emission intensity as toxic emission, Hisu, Li and Tsou (2023) show that high emission intensity portfolios provide a higher subsequent return than the low emission intensity. The average excess return of a portfolio being long in high-intensity emission and short in low-intensity emission is calculated as 4.42 percent. They control for factors that are known for explaining the risk premium. This implies that investors expect and require a higher investment return in polluting firms.

As the global carbon emissions must go down to zero by 2050 from the current high level, such a change in carbon transition by firms involved in production or consumption of carbon, may cause uncertainty and it is expected to result in decline in their stock prices. Such a change is defined by Bolton and Kacperczyk (2023), as the carbon transition risk, and they study the evolving risk premium with the carbon transition risk in 77 countries covering 14,400 publicly traded firms which represent over 80 percent of the global market value during 2005-2018. The carbon transition risk applies to such materials' production, refinement, and transportation.

They find that: a) risk premium in the carbon industry is statistically and economically positively correlated with both the level and rate of change in carbon emissions. This applies to both the production, distribution and consumption of carbon. For a one standard deviation increase in production of carbon, the annual risk premium rises by 1.1 percent, and increase in risk premium amounts to 2.2 percent for changes or growth in carbon production; c) equity premium in countries with a lower GDP per capita is higher; d) active investors engaging in negotiation, "investors' voice," or the "rule of law," appear to affect the short run rate of growth in carbon transition risk premium. Countries with stronger rule of law in which climate policies are unlikely to change, have a larger long term carbon transition risk premium; e) carbon transition risk premium is lower in countries with more renewable energy and who are less dependent on the energy sector; f) the 2015 Paris Agreement had caused a long-term carbon transition risk with the results being stronger in Asia; g) one standard deviation in direct emission results in 13 percent higher book to market value. Bolton, and Kacperczyk (2023) measure carbon emission intensity and efficiency per unit of sales to be neutral to the firm size. They also include book to market value and ROE as independent variables to neutralize the impact of growth in earnings on the growth of carbon emissions. Data are taken from Trucost for firm-level carbon emissions, FactSet for company financial statements, World Bank and Germanwatch (providing global climate policy and risk indexes).

Cost of Capital and Value of the Firm

Chava (2014) analyzes the cost of capital during 1992-2007, and finds that the required return on the part of stockholders for firms producing hazardous waste, causing pollution and with climate change concerns, is substantially higher by 1.38 percent compared to environmentally friendly firms. Banks further charge a much higher cost on loans to these firms. He uses data in KLD-MSCI for environmental profile of the firms, as well as the analysts' earnings estimates in I/B/E/S, and firm's 10-K reports during 1992-2007, and finds that the cost of capital, or investors' expected return, for firms with negative environmental products such as hazardous waste, pollution, and climate change concerns, is substantially higher as compared to other firms. The higher cost of capital includes both the cost of debt and equity, and is not due to the risk of bankruptcy. For estimating the cost of equity capital, the analysts' earnings forecast is projected for the future using a sustained growth rate. The resulting imputed cost of capital is measured as the internal rate of return (IRR) that would lead to the same value for the present free cash flow to equity as the current stock price. For the cost of debt, data on bank loans are used. Regressions of the expected excess return onto environmental concerns and strengths by Chava (2014), show that the cost of equity capital for firms with environmental concerns is 1.38 percent higher and the cost of loan for firms with the same four environmental concerns is higher by 20 percent. This incremental rise in the cost of capital would

reduce the present value of the expected future cash flows to the firm and, controlling for other factors that may affect value, should result in a lower value for the firm and its equity.

Fernando, Sharfman and Uysal (2017) find that managing environmental risk by the firm is rewarded by the market while corporate policies to enhance greenness is not. They use KLD scores for environmental strength (6 factors), and concerns (7 factors). When a category meets or exceeds in a category it is assigned a value of 1, otherwise zero. They then classify firms as "green," "toxic," and "neutral," according to the combined scores: the green funds have positive environmental scores. Those with negative environmental scores are categorized as "toxic," and those with a score of zero as "neutral."

Fernando, Sharfman and Uysal (2017) find that mutual fund investors are more likely to invest in neutral funds than the green or toxic, and university endowment funds, pension funds as well as employee stock ownership plans hold smaller amount of the toxic firms while banks, and insurance companies hold lower amount of the green stocks. The Tobin "Q" ratio for the green stocks is also lower, indicating no excess value creation for greenness. Thus, institutional investors appear to invest in environmentally neutral firms, and are less likely to invest in green firms. The market does not reward the cost and effort for environmentally safe endeavors beyond the legal limit. Firms with a neutral overall KLD scores are preferred to both the green and toxic ones. Time horizon is 1996-2007. KLD environmental strengths indicators are: beneficial products and services; pollution prevention and recycling; clean energy; and management control systems and monitoring. KLD environmental concerns are: regulatory compliance; substantial emissions; climate change; negative impact of products and services; land use and biodiversity; and non-carbon emissions.

The credit market may also provide the capital for financing environmentally healthy investments. The sustainability-linked bonds, or green, social, sustainability, and sustainable-linked bonds (GSSS), are reviewed by Ilhan, Sautner, and Vilkov (2021) who show that downside risk in these bonds is lower as compared with the firms involved in environmentally hazardous production.

Heinkel, Kraus and Zechner (2001) produce an equilibrium model for the cost of capital and value of ethical firms, and show that green investors must exceed by at least 20 percent to cause polluting firms to reform. Firms with polluting technology will not be held by green investors, but may be held by neutral investors disregarding ethical considerations. This will reduce number of investors sharing the risk in polluting firms, raising their cost of capital and decreasing their value. The economic impact of green investors may cause polluting firms to follow reforms to make it acceptable for green investors.

The Role of Institutions in Safeguarding the Environment

Riedel and Smeets (2017) examine data on investors' holdings on a mutual fund in Netherlands during June 2006-June 2012 as to why an investor may hold socially responsible funds, and find that socially desired investors tend to accept a lower return due to their social preferences. However, expectations of such lower return appear to reduce the propensity of holding such investments. In addition, longer-term and large investors are more likely to allocate money to socially desired investments. By measuring the Sharpe ratio for socially responsible investments and conventional ones, they report that the Sharpe's reward to variability ratio is systematically lower for the social funds as compared to conventional funds: one year Sharpe ratio is 0.95 versus 1.15 for the socially responsible funds and conventional funds, respectively. The Shape ratio for three years is 0.01 versus 0.06, and for five years it is -0.07 versus -0.06 for the socially responsible and conventional funds, respectively. Meanwhile, annual expense ratio for socially responsible fund is higher; 2.2 percent for socially responsible and 1.5 percent for conventional funds.

Bauer, Rouf and Smeets (2021) conduct a field survey on a large Dutch pension fund in 2018, in which the retirees' monthly benefits and contributions of its members depend on the financial performance of the pension portfolio. Thus, poor performance will cause a reduction in benefits and increase the required contributions. Thereby, changes in asset allocation will have a direct effect on all of its members. In the first survey, the individual members of the pension plan were asked whether their pension plan should increase its focus on the United Nations Sustainable Development Goals (SDGs), such as climate actions, responsible consumption and production, among other things. The results show that 67.9 percent of pension participants desire engagement with the portfolio companies for increasing sustainability, 10.8 percent were

against, while 21.2 percent had no opinion. Based on the prior empirical findings in this regard, Bauer, Rouf and Smeets (2021) hypothesize that: a) pension plan participants have expectations of better performance for sustainable firms over the conventional firms; b) pension plan participants to have strong social preference; c) either pension plan participants do not take the case seriously or may be confused. They then show that social preferences appear to be the reason for their choice. Based on the survey results, the pension plan increased its interaction with the portfolio companies to improve sustainability. In the follow up survey, they explained the actions made by the pension fund for increasing sustainability, and asked for participants' views to ensure their support and agreement. 98.8 percent who had voted "yes" for increased sustainability supported the implementation and 76.9 percent of participants who had voted no stated their agreement with the board's actions.

Ambec and Lanoie (2008) provide a detailed overview of benefits and costs of corporate environmental actions. They cite several examples of special and strong demand for "green" products and that the environmentally friendly firms may benefit from access to a larger market and an increase in profitability due to product differentiation. Regarding the cost of capital, they hypothesize that due to the increasing interest by mutual funds for green companies, better access to the credit market, and preference of stockholders, the overall cost of capital should be lower for sustainable firms than those of conventional firms. They further show the negative performance of stocks to bad news in event studies of a loss over 2 percent, and hypothesize that investors may shy away from polluting firms in the long run.

Dyck, Lins, Roth and Wagner (2019) by analyzing data in 41 countries on institutional ownership, reveal that institutional ownership is positively associated with environmental and social performance and it is causal. Institutions are motivated by financial and social returns in environmental investments due to individuals' perceived interest in such investments. And corporate managers pursue such actions due to either investors' pressures, or for its limited downside risk. They construct an index for environmental impact using CO_2 emissions and renewable energy for environmental, and human rights violations and employment quality for social factors. They regress the environmental and social performance of the firm onto the past (lagged) one-year investment by institutional investors while controlling for other factors that may affect environmental and social performance, and find that; a) one standard deviation change in institutional ownership is associated with an increase in their constructed environmental performance index by 4.5 percent. When they use the published sources of environmental and social scores, a one standard deviation change in institutional ownership is associated with 6.8 percent in environmental performance score. The increase in social performance score, due to one-year past institutional investments, is 2.1 percent for their constructed index and 8.2 percent for the publicly available index. The results are twice as much for investors who follow the Principles of Responsible Investments of the UN. Dyck, Lins, Roth and Wagner (2019) further show that this relation is causal as the 2010 BP oil spill increased the financial value of firms pursuing safe environmental policies. They further show that private engagement with the firms is the primary driving force in improving environmental and social investments. In addition, the social rewards are higher for investment managers in communities, such as European countries, with emphasis on environmental and socially responsible investing. In this case, environmental and social performance score would rise by 7.4 percent for their constructed index and 5.2 percent for the publicly available index as a result of the past one-year institutional investment. Dyck, Lins, Roth and Wagner (2019) further find that foreign investors, with high emphasis on environmental and social performance who invest in U.S. firms tend to raise the environmental and social performance scores of U.S. firms. Overall, they show that investors play an important role in improving business enterprises' environmental and social performance scores.

Their data are taken from the Thomson Reuters ASSET4ESG database, where data sources are from annual reports, corporate sustainability reports, and news. Data are annual covering 44 countries. ASSET4ESG is in regards to emissions reduction, product innovation, and resource reduction. Social criteria include diversity and opportunity, employment quality, health and safety, human rights, product responsibility, and training and development. Dyck, Lins, Roth and Wagner (2019) construct an index consisting of the individual items listed in the above criteria by assigning a one for good performance, and form an equally weighted index. They further use the Z score index provided by Thomson Reuter's

ASSET4ESG. Other data used are from Sustainanalytics, and Bloomberg. Institutional ownership is taken from Factset ownership database. Final sample includes 3277 firms from 41 countries during 2004-2013. Given the above-mentioned environmental score indexes and the percentage of institutional ownership X, and firm-level control variable Y, and country-industry fixed effects A, their first regression is as shown in equation (4). Firm-level control variables are: logarithm of total assets; asset tangibility; leverage; Tobin's Q ratio; and profitability.

$$\text{Log}(scores_t) = a + b\,X_{t-1} + c\,Y_{t-1} + A + e_t \quad (4)$$

Given the standard deviation of institutional ownership of 0.168 and the beta coefficient of institutional ownership (X) of 0.268 for environmental factors, the product of the two (i.e., 0.168*0.268) shows the change in environmental score of 4.5 percent as a result of one standard deviation change in institutional ownership.

Their second regression is as shown in equation (5).

$$Log(score_t) = a + b_1 X_{t-1} + b_2\,Post\ event + b_3\,X_{t-1} * Post\ event + b_4\,Y_t + A + e_t \quad (5)$$

Here b_3 is the interaction coefficient of institutional ownership after event (0.216 for oil and gas exploration) with the percentage of institutional ownership X, and shows the relation between institutional investors and company after the environmental event. As b_3 is positive, it shows improvement in environmental conduct by the firm. Overall, the threat of exit is not an effective way to improve the firm's environmental performance. Motivation for institutional investors for investing in environmentally safe companies are: value enhancing; environmental safety, their perceived appearance as an insurance against event risk, product market differentiation; and the effect of culture, values and norms of the society.

CONCLUSIONS

While maximizing wealth to stockholders is a theoretically sound approach, in practice this may be more a case of a constraint optimization. In particular, safeguarding the environment, mitigating the global warming hazards, and pursuing other socially desirable goals appear to rank high among individuals and institutional investors as, for example, shown by the flow of money to investments in firms with high environmental and socially desirable production, products and services. Thus, such constraints will affect the optimization process.

Investors have further shown requiring higher risk premium as a compensation for taking the risk on investing in firms producing hazardous materials, thereby raising their cost of capital. Environmentally friendly, sustainable, and socially desirable investments are more common in civil law countries, such as the European countries, with coded laws and regulations imposed on firms' internal governance and investment activities.

As noted by Laura Stark in her 2023 presidential address to the American Finance Association, if motivation for sustainable investments, socially desirable investments, and investing in firms with sound corporate governance and internal control mechanisms is based on values and social preference, then a lower ex-post performance may not be surprising due to its lower anticipated risk and its limited risk of large losses. The potential demand for sustainable and socially desirable investments, and the likely resulting rise in their market price, may further attract value investors.

However, empirical results of the single and multi-factor asset pricing models do not show superior excess risk-adjusted returns for sustainable and socially desirable investments. Their Sharpe reward-to-risk ratio further reveals the same.

REFERENCES

Ambec, S., & Lanoie, P. (2008, November). Does it pay to be good? A systematic overview. *Academy of Management Perspective*, *22*(4), 45–62.

Bauer, R., Rouf, T., & Smeets, P. (2021). Get real! Individuals prefer more sustainable investments. *Review of Financial Studies*, *34*, 3976–4043.

Bialkowski, J., & Starks, L. (2018). *SRI funds: Investor demand, exogenous shock, and ESG profiles*. Working Papers. University of Canterbury.

Bolton, P., & Kacperczyk, M. (2023, December). Global pricing of carbon-transaction risk. *The Journal of Finance*, *LXXVIII*(6).

Cai, Y., Pan, H., & Statman, M. (2016). Why do countries matter so much in corporate social performance. *Journal of Corporate Finance*, *41*, 591–609.

Chava, S. (2014, September). Environmental externalities and cost of capital. *Management Science*, *60*(9), 2223–2247.

Climent, F., & Soriano, P. (2021, October). Green and good? The investment performance of U.S. environmental mutual funds. *Journal of Business Ethics*, *103*(2), 275–287.

Dorwell, G., Hart, S., & Yeung, B. (2020). Do corporate global environmental standards create or destroy market value? *Management Science*, *46*, 1059–1074.

Dyck, A., Lins, K., Roth, L., & Wagner, H. (2019). Do institutional investors drive corporate social responsibility? International evidence. *Journal of Financial Economics*, *131*, 693–714.

Fernando, C., Sharfman, M., & Uysal, V. (2017, October). Corporate environmental policy and shareholder value: Following the smart money. *The Journal of Financial and Quantitative Analysis*, *52*(5), 2023–2051.

Geczy, C., Stambaugh, R., & Levin, D. (2021). Investing in socially responsible mutual funds. *Review of Asset Pricing Studies*, *11*, 309–351.

Gilan, S., Koch, A., & Starks, L. (2021). Firm's social responsibility: A review of ESG and CSR research in corporate finance. *Journal of Corporate Finance*, *66*.

Graham, J. (2022, August). Presidential address: Corporate finance and reality. *Journal of Finance*, *77*(4).

Hartzmark, S., & Sussman, A. (2019, December). Do investors value sustainability? A natural experiment examining ranking and fund flows. *The Journal of Finance*, *74*(6), 2789–2837.

Heinkel, R., Kraus, A., & Zechner, J. (2001, December). The effect of green investment on corporate behavior. *The Journal of Financial and Quantitative Analysis*, *36*(4), 431–449.

Hisu, P., Li, K., & Tsou, C. (2023, June). The pollution premium. *The Journal of Finance*, *LXXVIII*(3), 1343–1392.

Hong, H., & Kacperczyk, M. (2009). The price of sin: The effects of social norms on markets. *Journal of Financial Economics*, *93*, 15–36.

Ibikunle, G., & Steffen, T. (2015, October). European green mutual fund's performance: A comparative analysis with their conventional funds. *Journal of Business Ethics*, *145*(2), 337–355.

Ilhan, E., Krueger, P., Sautner, Z., & Starks, L. (2023). Climate risk disclosure and institutional investors. *Review of Financial Studies*.

Krueger, P., Sautner, Z., & Starks, L. (2020). The importance of climate risk for institutional investors. *Review of Financial Studies*, *33*, 1067–1111.

Liang, H., & Renneboog, L. (2017, April). On the foundation of corporate social responsibility. *The Journal of Finance*, *LXXII*(2), 853–909.

Lins, K., Servaes, H., & Tamayo, A. (2017). Social capital, trust, and firm performance. The value of corporate social responsibility during financial crisis. *Journal of Finance*, *72*, 1785–1824.

Luo, A., & Balvers, R. (2017, February). Social screens and systematic investor boycott risk. *The Journal of Financial and Quantitative Analysis*, *52*(1), 365–399.

Muller, R. (2009). *Physics for future presidents*. NY: W.W. Norton and Company.

Pedersen, L., Fitzgibbons, S., & Pomorski, L. (2021, November). Responsible investing: The ESG-efficient frontier. *The Journal of Financial Economics*, *142*(2), 572–597.

Renneboog, L., Horst, J., & Zhang, C. (2008). The price of ethics and shareholder governance: The performance of mutual funds. *Journal of Corporate Finance, 14*, 302–322.
Riedel, A., & Smeets, P. (2017, December). Why do investors hold responsible mutual funds? *The Journal of Finance, 72*(6), 2505–2549.
Simon, H. (1947). *Administrative behavior*. New York: MacMillan.
Starks, L. (2023, August). Presidential address: Sustainable finance and ESG issues—Value versus values. *The Journal of Finance, LXXVIII*(4), 1837–1872.
Starks, L., Venkat, P., & Zhu, Q. (2022). *Corporate ESG profiles and investor horizons*. Working Paper. University of Texas, Austin.