

Would ESG Performance Enhance Pension Performance? An Expectations Perspective

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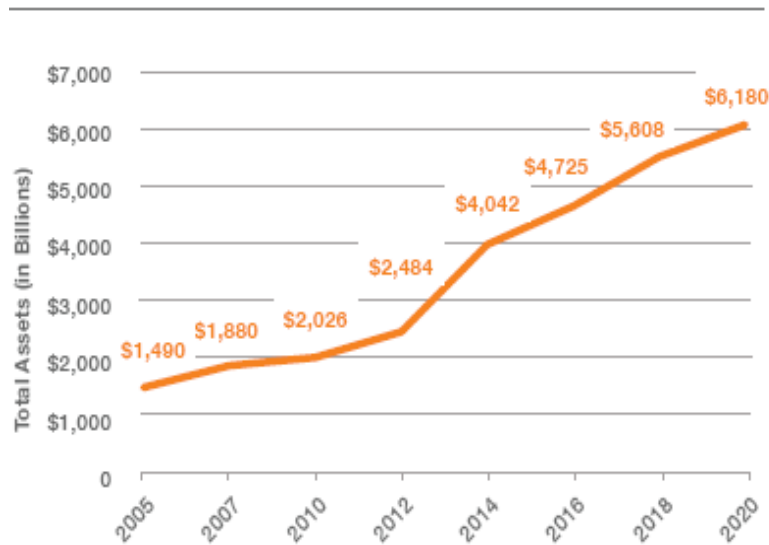


**Sustainable Investment in Retirement Plans:
Challenges and Opportunities**
April 29-30, 2021

ESG Growth

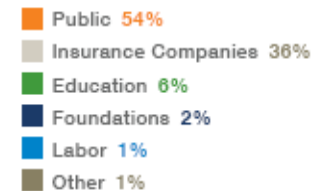
ESG: Environmental, Social and Governance criteria

Growth of ESG Incorporation Reported by Institutional Investors
2005–2020



SOURCE: US SIF Foundation.

Institutional Investor ESG Assets,
by Investor Type, 2020



SOURCE: US SIF Foundation.

NOTE: Other consists of family offices, healthcare institutions, faith-based institutions and other nonprofits that collectively represent about 1 percent of ESG assets in 2020.

90% of institutional ESG assets are managed by public funds (such as SRI mutual funds) and insurance companies.

Source: US Social Investment Foundation, 2020 Trends Report.

Framing ESG Challenges and Opportunities

A (super simple) view of ESG via Quadratic (Mean-Variance) Utility:

$$\text{Utility} = E(R) - \frac{1}{2} * A * [\text{std dev}(R)^2] + g(\text{Impact})$$

Negative/Positive Screens and Portfolios

- In such a simple, rational world in which ESG is implemented only as a constraint, $g(\text{Impact})$ presumably compensates for lower $E(R)$ and/or higher $\text{std dev}(R)$.
 - However, Lower Sharpe Ratios are a potential problem for fiduciaries/trustees (although see the forthcoming paper in the RFS).
 - Still, side by side might be fine (DOL Guidance over the years)
 - Portfolio diversification and alpha may yet be an issue (Geczy, Stambaugh and Levin [2005, 2021]) with negative screens
 - It's an empirical question: Does a constraint bind?
 - See CalPERS and others on auto fuel efficiency
- Obvious point: positive screens are negative screens (weights sum to one)
- Another obvious point: If via ESG/Sustainable or Impact Investing we're expanding the investment opportunity set, Sharpe Ratios might go UP!

Framing ESG Challenges and Opportunities

A (super simple) view of ESG via Quadratic (Mean-Variance) Utility:

$$\text{Utility} = E(R) - \frac{1}{2} * A * [\text{std dev}(R)^2] + g(\text{Impact})$$

Expected Returns and/or Risk

- BUT, in a world with both regulations like Reg FD and limited scope of GAAP disclosures, ESG data may provide salient information on E(R) or std dev (R)
 - E.g., ESG may measure intangibles like employee satisfaction, brand value, better management, etc.
 - E.g., ESG may correlate with factor exposures like the quality factor in returns

Asset Managers are mentioning all of the above

And then there's activism and engagement (ESG 2.0)

Reported Institutional Motivations for ESG Inclusion

Reasons Institutional Investors Report Considering ESG Factors, 2020

Reason	Number of Money Managers	% of Managers Responding	ESG Assets (in Billions)
Risk	95	84%	\$2,062
Client Demand	92	81%	\$3,569
Social or Environmental Impact	90	80%	\$3,476
Returns	82	73%	\$2,355
Mission	79	70%	\$2,445
Fiduciary Duty	72	64%	\$3,557
UN Sustainable Development Goals	52	46%	\$406
Regulatory Compliance	24	21%	\$3,345
Total Responding	113		\$3,621

SOURCE: US SIF Foundation.

NOTE: Managers of community development loan funds who responded to these questions are also included. Respondents could choose multiple reasons, so counts and percentages do not sum.

Source: US Social Investment Foundation, 2020 Trends Report

ESG: The U.S. Dept. of Labor's View

Robert J. Doyle (Director, Office of Regulations and Interpretations, U.S. DOL, 1998)

*In discharging investment duties...fiduciaries must, among other things, consider the role of the particular investment [in the] investment portfolio. Because every investment necessarily causes a plan to forgo other investment opportunities fiduciaries also must consider **expected return on alternative investments with similar risks available to the plan. [emphasis added]**...If [those] requirements are met, the selection of a “socially responsible” mutual fund as either a plan investment or a designated investment alternative...would not, in itself, be inconsistent with ...fiduciary standards.*

Thomas Peres (DOL Secretary, 2015)

*“The question is this: Can an ERISA plan invest in projects or companies that serve the common good, while still keeping at the forefront the fiduciary principle of investing prudently and for the exclusive benefit of retirees and workers? I believe we can.” He also said, “**The 2008 guidance gave cooties to impact investing.**”*

Eugene Scalia (DOL Secretary, 2020)

“As ESG investing has increased, it has engendered important and substantial questions with numerous observers identifying a lack of precision and consistency in the marketplace with respect to defining ESG investments and strategies, as well as shortcomings in the rigor of the prudence and loyalty analysis by some participating in the ESG investment marketplace. There is no consensus about what constitutes a genuine “ESG” investment, and ESG rating systems are often vague and inconsistent, despite featuring prominently in marketing efforts.”

First: Side-by-Side Comparisons

GSL (2005, 2021)

GSL Table 2: Mutual Fund Characteristics

A. Average Fund Characteristics					
Aggregate Mutual Fund Portfolios	Expense Ratio (%/yr)	Turnover (%/yr)	TNA (\$MM)	Load (%)	
Average (EW) Non-Socially Responsible Mutual Fund	1.10	175.2	257.24	3.63	
Average (EW) Socially Responsible Mutual Fund	1.36	83.3	153.09	4.26	

B. Posterior Means and "t-statistics" of Four-Factor Model δ 's and Factor Loadings					
Aggregate Mutual Fund Portfolios	δ	MOM	SMB	HML	MKT
Average (EW) Non-Socially Responsible Mutual Fund	0.0008 (0.17)	0.0278 (2.06)	0.1638 (9.66)	-0.0359 (-1.23)	0.8330 (22.41)
Average (EW) Socially Responsible Mutual Fund	0.0021 (0.23)	0.0504 (3.72)	0.2047 (12.07)	-0.0299 (-1.02)	0.8935 (24.04)

Side by side comparisons look
 "fine" even with a focus on negative
 screening and even in mutual funds!

This Paper: Focus on E(R) Models and ESG Characteristics

We show that in specific cases with long-standing models:

- **ESG characteristics interact with expected returns of U.S. equities as a function of models for those expectations.**
 - High (environmental) ESG scores are associated with excess returns unconditionally and conditional on expected return models
 - (Now) traditional factor models subsume neither environmental related return differentials nor expected return premia from those models
 - Combining information from both inputs (expected return models and ESG information) might provide advantage
- There are **implications for fiduciaries** required to compare expected returns of alternative investments holding risk constant.
 - Side by side comparisons may survive(!)
 - Diversification results are still in question
- (Partially reported) ESG characteristics are associated with a value, quality and momentum factors in returns which are generally positively correlated with earnings forecast depth and breadth and negatively associated with profitability.
- And there is still a lot to do...

Models for Expected Return

We consider four models of expected returns from academic and industry research*.

USER – Robust regression-based multifactor model first developed by Guerard (1992, 1993) incorporating E/P, B/P, C/P, Sales/P, CTEF (earnings) and PM (momentum).

- Extends Block, Guerard, Markowitz and Xu (1993) model with CTEF and PM.
- CTEF is a sub-model that incorporates consensus EPS I/B/E/S forecasts revisions and breadth

EWC – An unoptimized equal weighted version of the above (10% per signal)

EVALUE – A naïve equal weighted value model invoking just earnings, book, Cashflow and sales

MQ – An equal weighted component of USER not including the value elements (CTEF and PM)

The U.S. Expected Return (USER) Model

The **USER** characteristics model is expressed in time series as:

$$\begin{aligned} TR_{t+1} = & a_0 + a_1 EP_t + a_2 BP_t + a_3 CP_t + a_4 SP_t + a_5 REP_t + a_6 RBP_t + a_7 RCP_t \\ & + a_8 RSP_t + a_9 CTEF_t + a_{10} PM_t + e_t \end{aligned} \quad (2)$$

where: EP = [earnings per share]/[price per share] = earnings-price ratio;

BP = [book value per share]/[price per share] = book-price ratio;

CP = [cash flow per share]/[price per share] = cash flow-price ratio;

SP = [net sales per share]/[price per share] = sales-price ratio;

REP = [current EP ratio]/[average EP ratio over the past five years];

RBP = [current BP ratio]/[average BP ratio over the past five years];

RCP = [current CP ratio]/[average CP ratio over the past five years];

RSP = [current SP ratio]/[average SP ratio over the past five years];

CTEF = consensus earnings-per-share I/B/E/S forecast, revisions and breadth,

PM = Price Momentum; and

e = randomly distributed error term.

The other models are subsets:

- **EWC** sets a_1 through $a_{10} = 10\%$
 - Tests out of sample optimization of USER weights
- **EVALUE** sets a_5 through $a_{10} = 0$ and a_1 through $a_4 = 25\%$
 - “Bagged” value model
- **MQ** sets a_1 through $a_8 = 0$
 - Consensus earnings forecasts, revisions and breadth

Results: Baseline Models

Table: Baseline Performance of Four Models of Expected Returns

The tables show performance and factor exposures of quintile portfolios formed on four expected return models: The 10-factor U.S. Expected Return model (**USER**) of Guerard (1991 and 1993) and Block et al (1993) incorporating earnings yield, book to market, cashflow to price, and sales to price ratios along with these ratios scaled by the average ratios over the previous five years as well as CTEF and price momentum. CTEF measures consensus earnings per share I/B/E/S forecasts, revisions and breadth, and PM is 7/1 price momentum PM). In addition, results for an equal weighted model with the same characteristic variables (**EW**), an equal-weighted naive value-based model using just the scaled price ratios above (**EVALUE**), and **MQ**, an equal-weighted model including CTEF and prime momentum. Monthly Quintile portfolio returns or L/S zero investment portfolio returns are regression on the one-factor U.S. equity premium (RMRF) model (the CAPM), the Fama-French/Carhart four factor model, and a Fama French five factor model that includes the FF quality factor.

Multifactor Models Regressions (March 1991 - December 2017)

	One Factor Model			Fama French/Carhar Four Factor Model						Fama French Five Factor Model						
	RMRF	Intercept	Adj R ²	RMRF	SMB	HML	MOM	Intercept	Adj R ²	RMRF	SMB	HML	MOM	Quality	Intercept	Adj R ²
USER																
Quintile 5	1.24	3.2%	76.9%	1.02	0.86	0.07	-0.55	3.6%	90.8%	1.00	0.81	0.10	-0.54	-0.13	4.3%	90.9%
Quintile 4	1.13	2.2%	77.1%	0.96	0.64	0.24	-0.21	2.0%	94.3%	0.97	0.67	0.23	-0.22	0.08	1.5%	94.4%
Quintile 3	1.05	2.5%	74.6%	0.91	0.63	0.28	-0.22	2.8%	93.3%	0.92	0.65	0.27	-0.22	0.05	2.5%	93.3%
Quintile 2	1.10	1.6%	77.0%	0.98	0.67	0.23	-0.21	2.5%	94.2%	1.00	0.70	0.21	-0.22	0.09	2.0%	94.3%
Quintile 1	1.32	-0.1%	64.8%	1.11	0.80	0.15	-0.04	0.4%	93.9%	1.09	0.76	0.17	-0.03	-0.10	1.0%	94.0%
L/S (Q5-Q1)	-0.08	3.3%	0.2%	-0.09	0.06	-0.08	-0.51	3.2%	53.6%	-0.09	0.05	-0.07	-0.51	-0.03	3.3%	58.1%
EW																
Quintile 5	1.23	1.7%	75.1%	1.05	0.72	0.22	-0.31	2.9%	93.8%	1.05	0.72	0.22	-0.31	0.00	2.9%	93.8%
Quintile 4	1.17	1.4%	75.9%	1.00	0.72	0.15	-0.23	2.1%	93.8%	1.01	0.74	0.14	-0.23	0.05	1.9%	93.8%
Quintile 3	1.09	1.6%	74.5%	0.94	0.68	0.22	-0.23	2.1%	93.1%	0.94	0.68	0.21	-0.23	0.00	2.1%	93.1%
Quintile 2	1.15	1.2%	77.1%	0.99	0.69	0.18	-0.22	1.8%	94.4%	1.00	0.70	0.17	-0.22	0.02	1.7%	94.4%
Quintile 1	1.20	1.6%	73.5%	1.02	0.79	0.21	-0.24	2.2%	93.3%	1.00	0.76	0.23	-0.24	-0.09	2.7%	93.4%
L/S (Q5-Q1)	0.03	0.1%	3.2%	0.03	-0.07	0.01	-0.07	0.7%	9.8%	0.04	-0.04	-0.01	-0.07	0.09	0.2%	14.2%
EVALUE																
Quintile 5	1.13	3.0%	67.0%	0.91	0.74	0.12	-0.36	5.0%	89.2%	0.89	0.70	0.14	-0.36	-0.13	4.7%	89.3%
Quintile 4	1.06	2.4%	69.4%	0.89	0.75	0.11	-0.18	3.0%	89.3%	0.87	0.71	0.13	-0.18	-0.09	3.5%	89.4%
Quintile 3	0.97	2.9%	69.1%	0.82	0.65	0.13	-0.19	3.6%	88.0%	0.80	0.62	0.14	-0.19	-0.08	4.0%	88.0%
Quintile 2	1.04	2.1%	70.7%	0.88	0.71	0.15	-0.19	2.6%	89.9%	0.87	0.68	0.16	-0.18	-0.07	3.0%	89.9%
Quintile 1	0.98	2.3%	69.5%	0.83	0.68	0.08	-0.17	2.9%	88.9%	0.80	0.63	0.11	-0.16	-0.14	3.7%	89.1%
L/S (Q5-Q1)	0.15	0.7%	18.2%	0.09	0.06	0.04	-0.19	2.0%	44.5%	0.09	0.07	0.03	-0.19	0.00	1.0%	55.4%
MQ																
Quintile 5	1.13	3.5%	76.1%	1.04	0.86	0.02	-0.69	2.3%	90.4%	1.02	0.82	0.05	-0.69	-12.8%	3.1%	0.90
Quintile 4	1.14	2.8%	78.7%	0.99	0.73	0.18	-0.32	2.0%	94.1%	0.98	0.71	0.20	-0.32	-5.5%	2.3%	0.94
Quintile 3	1.05	1.6%	74.0%	0.91	0.66	0.24	-0.20	1.8%	92.3%	0.92	0.68	0.23	-0.20	4.9%	1.6%	0.92
Quintile 2	1.19	0.5%	73.9%	1.01	0.69	0.22	-0.13	2.5%	94.9%	1.02	0.70	0.21	-0.13	2.4%	2.3%	0.95
Quintile 1	1.38	-2.7%	61.4%	1.06	0.72	0.20	0.10	1.4%	93.8%	1.07	0.73	0.19	0.10	2.8%	1.2%	0.94
L/S (Q5-Q1)	-0.26	6.2%	6.0%	-0.02	0.14	-0.18	-0.80	0.9%	71.0%	-0.05	0.09	-0.14	-0.79	-0.16	1.8%	0.35

ESG Measurement

MSCI/KLD Scores

- We use MSCI/KLD ESG Scores to enhance comparability and out of sample comparisons following Geczy et al. (2020) and others
- However, there are difficulties in comparing results across papers and time.
 - Dataset revisions change scores
 - In 2010, KLD decided to rank companies only on issues relevant to their industry as opposed to all issues.
 - Persistence declines after approximately 2 years, making rebalancing crucial for SRI portfolios
 - Implicit bias arising from weighting each issue equally
 - Changing coverage of the KLD dataset over time
- For each subcategory, for each company in each year,
 - Normalize the strengths (weaknesses) by dividing the sum of the strengths Booleans by the concurrent dimension of the Strengths
 - Deduct the normalized weaknesses from the normalized strengths to obtain the category normalized net scores.
 - Subtract the corresponding industry average normalized net score from each company's normalized score, making the scores industry-neutralized

Expected Returns, ESG and Factor Models: Focus on Environmental Scores

Table: The Interaction of Expected Return Models and ESG/KLD Scores: The Case of USER and Environmental Scores

The tables show performance and factor exposures of portfolios formed using the 10-factor U.S. Expected Return model (**USER**) of Guerard (1991 and 1993) and Block et al (1993) incorporating earnings yield, book to market, cashflow to price, and sales to price ratios along with these ratios scaled by the average ratios over the previous five years as well as CTEF and price momentum. CTEF measures consensus earnings per share I/B/E/S forecasts, revisions and breadth, and PM is 7/1 price momentum PM). The monthly returns of high (low) KLD Environmental score firms with high or low USER rankings or L/S zero investment portfolio returns are regressed on a one-factor U.S. equity premium (RMRF) model (the CAPM), the Fama-French/Carhart four factor model, and a Fama French five factor model that includes the Fama French quality factor.

Multifactor Models Regressions (March 1995 - December 2017)

	One Factor Model (CAPM)			Fama French/Carhart Four Factor Model						Fama French Five Factor Model						
USER	RMRF	Intercept	Adj R ²	RMRF	SMB	HML	MOM	Intercept	Adj R ²	RMRF	SMB	HML	MOM	Quality	Intercept	Adj R ²
High ENV + High USER	0.82	5.0%	59.7%	0.94	0.29	0.41	-0.07	4.6%	78.7%	0.99	0.44	0.28	-0.10	0.36	0.9%	79.8%
High ENV + Low USER	0.96	2.5%	62.9%	1.01	0.29	0.32	-0.16	4.2%	77.2%	1.01	0.38	0.26	-0.19	0.22	1.8%	77.1%
Low ENV + High User	0.99	1.6%	60.5%	1.13	0.16	0.57	-0.10	0.4%	72.5%	1.22	0.40	0.39	-0.15	0.59	-4.5%	76.9%
Low ENV + Low User	0.85	0.2%	51.9%	1.04	0.15	0.76	-0.24	1.0%	78.9%	1.10	0.35	0.60	-0.29	0.44	-2.8%	80.5%
High ENV: L/S USER	-0.15	2.5%	3.4%	-0.07	0.00	0.09	0.10	0.4%	4.1%	-0.02	0.07	0.02	0.09	0.14	-1.0%	3.6%
Low ENV: L/S USER	0.14	1.4%	7.0%	0.09	0.00	-0.18	0.14	-0.7%	15.5%	0.12	0.05	-0.21	0.13	0.15	-1.8%	15.7%
(High+High) - (Low+Low)	-0.03	4.8%		-0.10	0.14	-0.35	0.18	3.5%		-0.11	0.10	-0.32	0.19	-0.08	3.6%	

Some Conclusions

We show that in specific cases with long-standing models:

- Expected return models have important information for returns and for understanding environmental, social and governance related characteristics. ESG scores contain information about expected returns holding many factors constant.
- Fiduciaries who are required to compare expected returns of alternative investments holding risk constant may find that expected risk adjusted returns might increase
 - Side by side comparisons may survive
 - The question of course is always WHY?
 - Diversification results are still in question
- And there is still a lot to do...

Ongoing Research – The Principal Components of ESG Measurement

Strengths and Weaknesses		Spearman Correlation 2005 - 2015													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Governance Strengths	1	1.00	0.25	0.13	0.30	0.21	0.08	0.13	-0.12	0.09	-0.04	0.05	-0.03	0.10	-0.06
Community Strengths	2	0.25	1.00	0.31	0.16	0.32	0.42	0.35	-0.01	0.26	-0.18	0.01	0.04	-0.06	0.07
Diversity Strengths	3	0.13	0.31	1.00	0.21	0.36	0.23	0.25	0.14	0.02	-0.33	0.13	0.10	0.04	0.10
Employee Relations Strengths	4	0.30	0.16	0.21	1.00	0.40	0.10	0.29	0.04	0.06	-0.11	0.04	0.01	0.09	-0.05
Environment Strengths	5	0.21	0.32	0.36	0.40	1.00	0.34	0.50	0.02	0.04	-0.21	0.10	0.11	0.03	-0.03
Human Rights Strengths	6	0.08	0.42	0.23	0.10	0.34	1.00	0.41	0.05	0.12	-0.12	0.00	0.10	0.19	-0.15
Product Safety Strengths	7	0.13	0.35	0.25	0.29	0.50	0.41	1.00	-0.01	-0.05	-0.11	0.00	-0.02	-0.19	-0.11
Governance Weaknesses	8	-0.12	-0.01	0.14	0.04	0.02	0.05	-0.01	1.00	0.09	-0.02	0.12	0.14	0.13	0.23
Community Weaknesses	9	0.09	0.26	0.02	0.06	0.04	0.12	-0.05	0.09	1.00	-0.05	0.13	0.39	0.26	0.22
Diversity Weaknesses	10	-0.04	-0.18	-0.33	-0.11	-0.21	-0.12	-0.11	-0.02	-0.05	1.00	-0.02	-0.06	0.03	-0.07
Employee Relations Weaknesses	11	0.05	0.01	0.13	0.04	0.10	0.00	0.00	0.12	0.13	-0.02	1.00	0.26	0.14	0.19
Environment Weaknesses	12	-0.03	0.04	0.10	0.01	0.11	0.10	-0.02	0.14	0.39	-0.06	0.26	1.00	0.26	0.32
Human Rights Weaknesses	13	0.10	-0.06	0.04	0.09	0.03	0.19	-0.19	0.13	0.26	0.03	0.14	0.26	1.00	0.04
Product Safety Weaknesses	14	-0.06	0.07	0.10	-0.05	-0.03	-0.15	-0.11	0.23	0.22	-0.07	0.19	0.32	0.04	1.00

Joint with Samonov

Ongoing Research – The Principal Components of ESG Measurement

<i>Rotated Principal Components (2005 - 2015)</i>								
<i>Strengths and Weaknesses</i>	<i>PC 1</i>	<i>PC 2</i>	<i>PC 3</i>	<i>PC 4</i>	<i>PC 5</i>	<i>PC 6</i>	<i>PC 7</i>	<i>PC 8</i>
Environment Strengths	0.59	0.03	0.17	-0.35	0.11	0.01	-0.18	-0.25
Community Strengths	0.57	0.03	0.00	0.05	-0.04	-0.09	0.07	0.03
Diversity Strengths	0.52	-0.05	-0.26	0.26	-0.01	0.12	0.02	0.11
Product Safety Strengths	-0.07	0.64	0.07	0.13	-0.03	0.07	-0.16	-0.14
Employee Relations Strengths	0.17	0.58	0.11	-0.05	-0.09	0.00	0.18	0.27
Human Rights Strengths	-0.08	0.43	-0.37	-0.21	0.32	-0.09	0.10	-0.04
Product Safety Weaknesses	-0.06	0.17	-0.30	0.51	0.04	-0.09	-0.06	-0.37
Environment Weaknesses	-0.07	0.12	0.78	0.07	0.08	-0.03	0.04	-0.06
Governance Weaknesses	0.10	-0.02	0.22	0.67	0.01	0.00	-0.01	0.11
Employee Relations Weaknesses	0.00	-0.05	0.07	0.03	0.89	0.01	-0.04	0.07
Human Rights Weaknesses	0.05	-0.13	0.00	0.12	0.20	-0.54	0.18	-0.11
Community Weaknesses	0.00	-0.06	-0.02	0.08	0.16	0.81	0.15	-0.11
Governance Strengths	0.01	-0.03	0.07	-0.05	-0.07	0.02	0.06	-0.80
Diversity Weaknesses	0.02	0.00	0.02	-0.02	-0.02	0.00	0.91	-0.05

	Eigen Value	Variance Explained
PC 1	2.87*	21%
PC 2	2.03*	35%
PC 3	1.27*	44%
PC 4	1.13*	52%
PC 5	1.05	60%
PC 6	0.96	67%
PC 7	0.88	73%
PC 8	0.80	78%

Significance threshold: 1.05

Joint with Samonov

Thank You

Appendix

Pension industry enthusiasm for SRI/ESG is not universal ...



Source: *Pensions & Investments* (2013)

Protest & Politics in University Investing



Photo: GreenPhillyBlog.com

**Penn students
blockade President
Gutmann's office
over fossil fuel
divestment,
Nov. 2016**

Protest & Politics in University Investing



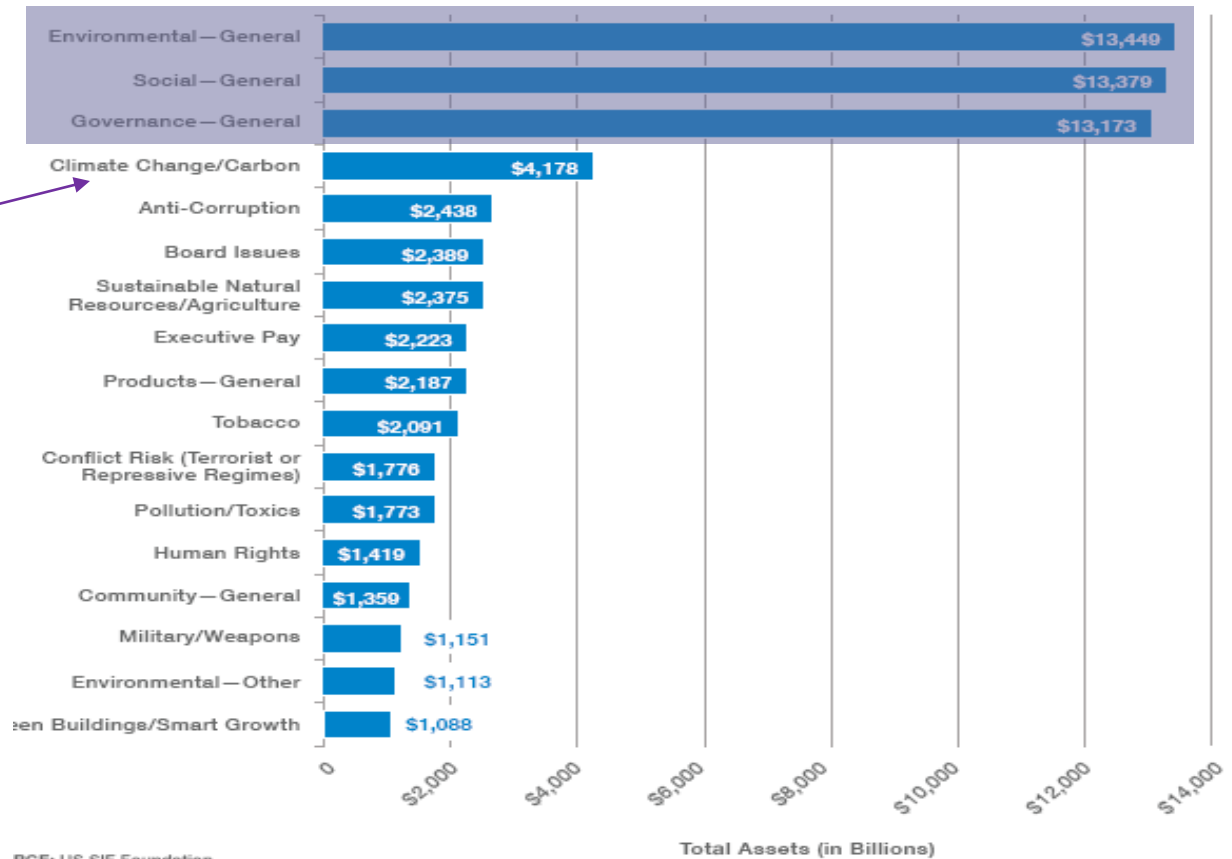
And the voice for climate change still rings loudly...

Photo: The Daily Pennsylvanian

Leading ESG Criteria

Leading ESG Criteria, by Assets, for Money Managers 2020

Climate change was the leading criterion among discrete ESG issues. “Anti-corruption” was #2.



RCE: US SIF Foundation.

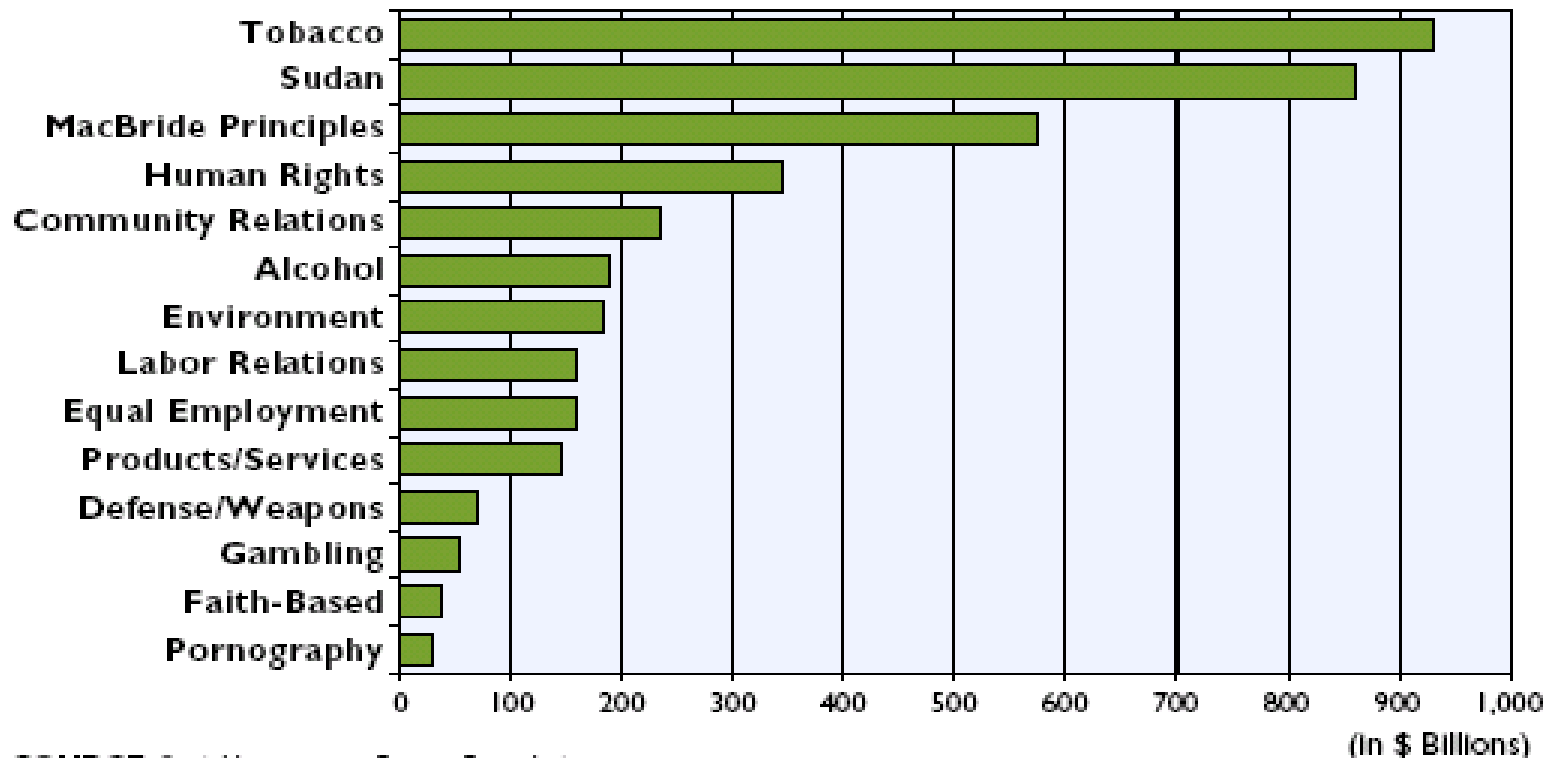
E: Data are aggregated across all investment vehicle types, including separate account vehicles and undisclosed investment vehicles.

Source: US Social Investment Foundation, 2020 Trends Report

Leading ESG Criteria in 2007

FIGURE 3.4

Social Screening by Institutional Investors • 2007



The MacBride Principles are a code of conduct for U.S. businesses with operations in Northern Ireland.

Source: US Social Investment Foundation, 2007 Trends Report.