

ESG in the Credit Market

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Corporate Environmental Management and Credit Risk (2011)

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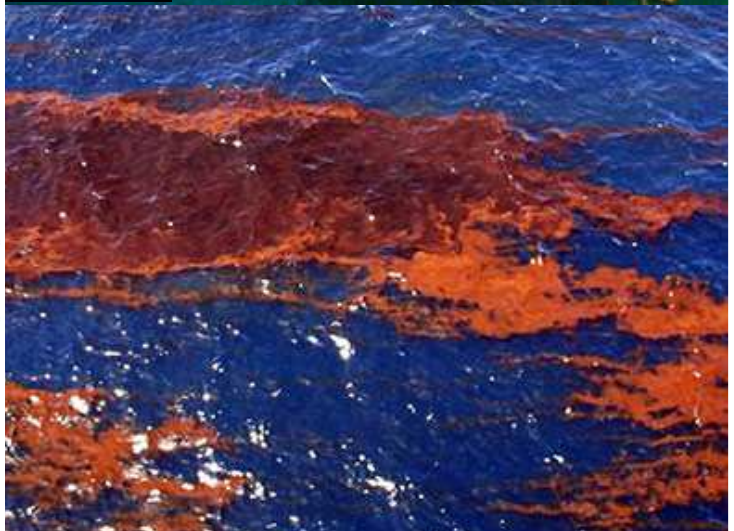
Research overview

- Motivation
 - Climate change, environmental disasters
 - Risk exposure of firms and investors
 - Lack of empirical evidence for credit market
- Central question

“Does corporate environmental management constitute a source of credit risk for bond investors?”
- Findings
 - Environmental performance is linked to significant differences in credit risk
 - Results robust and extendable to bank loans
 - Implications for credit screening and risk management

Conceptual framework

- Environmental performance and its impact on companies:
 - Litigation risk
 - Clean-up costs, fines, damages, legal costs
 - Reputation risk
 - Sales shocks, transaction costs (media, customers, suppliers, etc.)
 - Access to financing, liquidity constraints (investors)
 - Regulatory risk
 - Increased legal risks, tightened monitoring
 - Increased compliance-requirements and costs
 - Tax increases
 - Proactive environmental engagement
 - Reduced risk exposure, improved cash flows

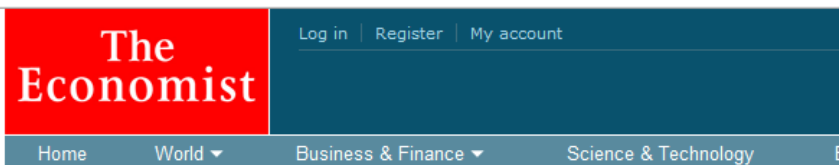


Legal, reputational, and regulatory risks



June 25, 2010

BP Plc faces at least 243 U.S. lawsuits so far arising from its role in the Gulf of Mexico oil spill, in what is considered by some the biggest environmental disaster in U.S. history.



American politics and business

Obama v BP

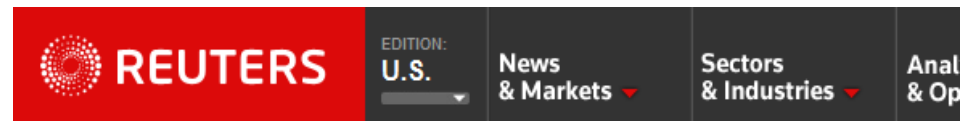
America's justifiable fury with BP is degenerating into a broader attack on business

Jun 17th 2010



"Oil producers around the world are bracing for stricter regulation."

"BP's spill was initially overseen by the U.S. Minerals Management Service. The agency, faulted for lax regulation, was broken into three by President Barack Obama on May 19, creating bodies to oversee leases, drilling safety and fee collection."



Factbox: BP lawsuits in the United States

Fri Jun 25, 2010 8:34am EDT

REUTERS - Shareholders have sued the board of BP Plc for failing to monitor safety and exposing the company to potentially enormous liability related to the Deepwater spill disaster in the Gulf of Mexico, according to court documents.



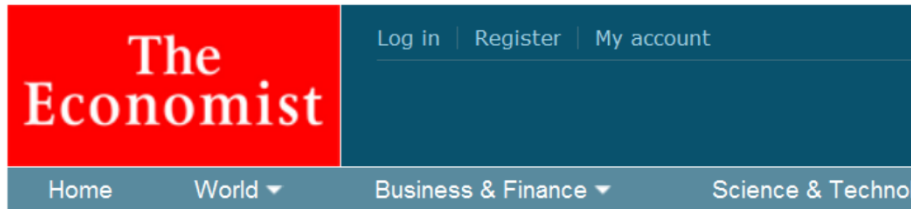
24 Jun 2010 14:15

New York State pension fund sues BP over losses

"BP misled investors about its safety procedures and its ability to respond to events like the ongoing oil spill, and we're going to hold it accountable."

"BP could now face class-action suits from many other pension funds, even those outside the US."

Financial impact

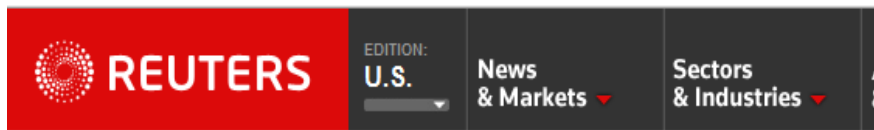


BP and the oil spill

The oil well and the damage done

BP counts the political and financial cost of Deepwater Horizon

Jun 17th 2010



UPDATE 3-Fitch downgrades BP by six notches, bonds plummet

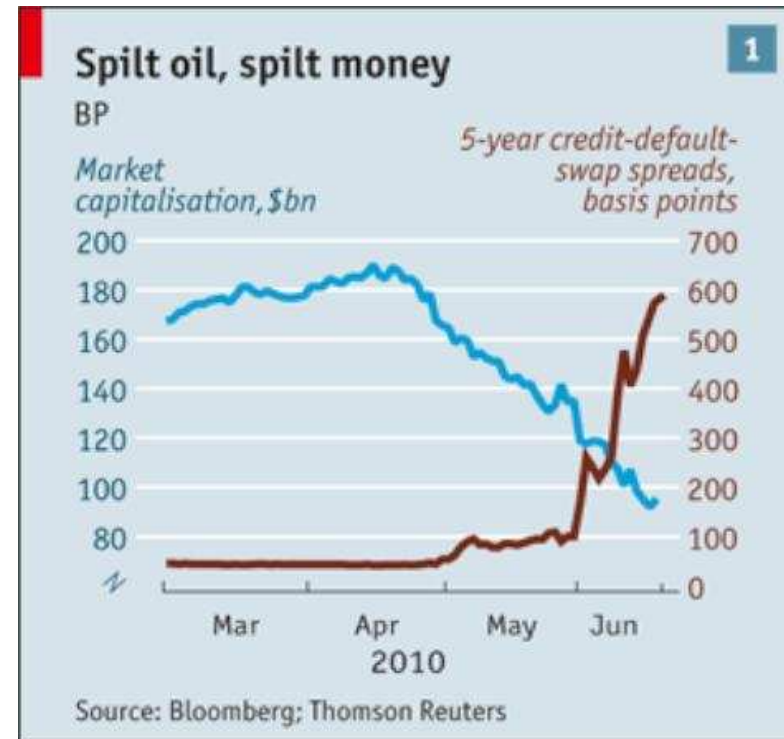
Tue Jun 15, 2010 1:48pm EDT

* First multi-notch rating fall for BP, and first below AA

* Rating still higher than implied by level in CDS market

* BP bonds plummet in secondary markets

The Economist - "Investors ... have driven down its (BP plc's) value by \$89 billion since the well erupted (after adjusting for declines in the wider stock market), far in excess of all but the most dire forecasts of the ultimate costs of the spill."



Hypotheses

Does the bond market account for environmental risks?

1. *“Firms with more environmental concerns have a higher cost of debt financing and lower credit ratings.”*
2. *“Firms with a more proactive environmental engagement have a lower cost of debt financing and higher credit ratings.”*
3. *“The link between environmental performance and credit risk is stronger for firms that operate in environmentally risky industries.”*
4. *“The impact of environmental performance on credit risk has increased over the recent decade.”*

Industry distribution of data sample

<i>SIC Division</i>	<i>Cost of Debt</i>	<i>Bond Rating</i>	<i>Issuer Rating</i>
Agriculture, Forestry, Fishing	0.1 %	0.0 %	0.2 %
Mining	3.9 %	4.1 %	5.1 %
Construction	2.3 %	2.3 %	1.4 %
Manufacturing	41.7 %	40.8 %	45.0 %
Transportation, Communication, Electric, Gas, Sanitary Services	19.3 %	19.6 %	17.9 %
Wholesale Trade	2.3 %	2.3 %	2.6 %
Retail Trade	7.6 %	8.0 %	7.8 %
Finance, Insurance, Real Estate	13.0 %	13.9 %	9.7 %
Services	9.6 %	9.0 %	9.7 %
Nonclassifiable establishment	0.2 %	0.2 %	0.5 %
<i># Observations</i>	<i>2,119</i>	<i>2,242</i>	<i>6,447</i>

Data

Environmental performance measures (KLD)

- $ENV_{Strengths}$ = Sum of strengths
- $ENV_{Concerns}$ = Sum of concerns
- 582 U.S. public corporations; 1995-2006 period

Credit risk measures

- Yield spreads, Bond ratings (new bond issues): 2,242
- Long-term issuer ratings: 6,420

Control variables

- Bond issue characteristics
 - Senior, unsecured, ‘vanilla’ bonds, seniority, time-to-maturity, issue size, credit grade
- Bond issuer characteristics
 - Leverage, firm size, capital intensity, interest coverage, ROA, loss

Cost of debt results

Bond spread = f (Environmental performance, Issuer & Issue characteristics, Industry, Year)

	<i>Model (1b)</i>	<i>Model (1c)</i>
ENV _{Strength}	-0,039** (-2.06)	-0.084*** (-4.79)
ENV _{Concerns}	0,049*** (2.91)	0.039*** (3.04)
BRmod		-0.326*** (-14.15)
<i>Year Fixed Effects</i>	<i>Yes</i>	<i>Yes</i>
<i>Industry Fixed Effects</i>	<i>Yes</i>	<i>Yes</i>
Adj. R ²	0.70	0.74
# Observations	2,119	2,068

* $p \leq 0.1$, ** $p \leq 0.05$, *** $p \leq 0.01$

t -statistics in brackets. Control variables not shown for space reasons.

Economic significance

Bond issue characteristics	Median	Mean
Issue size	\$300 mn	\$440 mn
Yield spread (p.a.)	120 bps (\$3.6 mn)	150 bps (\$6.6 mn)
Time to maturity	10 years	12.5 years

Estimated impact on the cost of debt	based on median	based on mean
$\Delta \text{ENV}_{\text{Strengths}} \text{ (SD)}$	- 6 bps	- 7 bps
$\Delta \text{ENV}_{\text{Concerns}} \text{ (SD)}$	+ 5 bps	+ 6 bps
Max. difference (top vs. bottom)	64 bps (\$1.9 mn)	80 bps (\$3.5 mn)

➤ Theoretical bond spread premium of max. 64 bps per annum.

Credit rating results

Bond rating = f (Environmental performance, Issuer & Issue characteristics, Industry, Year)

Issuer rating = f (Environmental performance, Issuer characteristics, Industry, Year)

	<i>Bond Ratings</i>	<i>Issuer Ratings</i>
ENV _{Strength}	0,162* (1.93)	0.075 (1.48)
ENV _{Concerns}	-0,193** (-2.18)	-0.146** (-2.09)
<i>Year Fixed Effects</i>	<i>Yes</i>	<i>Yes</i>
<i>Industry Fixed Effects</i>	<i>Yes</i>	<i>Yes</i>
Pseudo R ²	0.34	0.23
# Observations	2,242	6,420

* $p \leq 0.1$, ** $p \leq 0.05$, *** $p \leq 0.01$

t -statistics in brackets. Control variables not shown for space reasons.

Disaggregating the environmental effect:

Test of the individual performance indicators

	<u>ln(Spread)</u>	<u>Bond Rating</u>	<u>Issuer Rating</u>
ENV_{Strength}			
Beneficial Products	-0.190*** (-3.47)	0.039 (0.15)	0.355*** (4.08)
Pollution Prevention	0.003 (0.03)	0.246 (0.68)	0.190 (0.85)
Recycling	-0.126 (-1.45)	-0.012 (-0.04)	-0.345* (-1.72)
Clean Energy	-0.070*** (-2.62)	0.272** (2.08)	0.1207 (0.42)
Other Strengths	-0.186** (-2.00)	0.289* (1.88)	-0.108 (-0.72)
ENV_{Concerns}			
Hazardous Waste	0.020 (0.43)	-0.416 (-1.37)	-0.352* (-1.90)
Regulatory Problems	0.134** (2.15)	-0.592* (-1.95)	-0.678*** (-3.11)
Substantial Emissions	0.148** (2.46)	-0.593 (-1.59)	0.425** (2.33)
Agricultural Chemicals	0.079** (2.21)	-0.448 (-1.34)	0.002 (0.01)
Climate Change	0.140*** (2.86)	-0.684* (-1.73)	-0.534** (-2.02)
Other Concerns	0.170*** (4.05)	-0.184 (-0.74)	0.167 (0.59)
<i>Year Fixed Effects</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
<i>Industry Fixed Effects</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
Adj. R ²	0.72	0.35	0.26
# Observations	1,545	1,674	5,291

*p≤0.1, ** p≤0.05, *** p≤0.01

t-statistics in brackets.

Control variables not shown for space reasons.

Results for Paper- & Pulp industry

	<i>ln(Spread)</i>	<i>ln(Spread)</i>	Bond Rating	Issuer Rating
ENV _{Strengths}	-0.0761*** (-4.64)	-0.0285 (-1.24)	0.1616* (1.76)	0.0709 (1.28)
ENV _{Concerns}	0.0421*** (3.31)	0.0437** (2.31)	-0.1522* (-1.70)	-0.1334* (-1.81)
ENV _{Strengths} *P&A	-0.1330*** (-7.37)	-0.1464*** (-5.41)	0.0692 (0.72)	0.1210* (1.82)
ENV _{Concerns} *P&A	-0.0291* (-1.91)	0.0557*** (2.57)	-0.6163*** (-4.74)	-0.2354*** (-2.72)
P&A	-1.0938*** (-15.62)	-1.2937*** (-25.55)	1.0499*** (5.51)	-0.4527** (-2.14)
BRmod	-0.3273*** (-13.96)			
<i>Year Fixed Effects</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
<i>Industry Fixed Effects</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
Adj. R ² / Pseudo R ²	0.74	0.64	0.34	0.23
# Observations	2,068	2,119	2,242	6,420

* p≤0.1, ** p≤0.05, *** p≤0.01

Environmental concerns increasingly relevant

	1995 – 2001			
	<i>ln(Spread)</i>	<i>Spread</i>	<i>Bond Rating</i>	<i>Issuer Rating</i>
ENV _{Strength}	-0.127*** (-2.87)	-19.17*** (-3.26)	0.211 (1.28)	0.057 (0.71)
ENV _{Concerns}	-0.008 (-0.29)	-1.78 (-0.44)	-0.148 (-1.42)	-0.079 (-0.87)
Adj. R ² / Pseudo R ²	0.52	0.43	0.33	0.17
# Observations	1,114	1,117	1,195	2,323
	2002 – 2006			
	<i>ln(Spread)</i>	<i>Spread</i>	<i>Bond Rating</i>	<i>Issuer Rating</i>
ENV _{Strength}	-0.025* (-1.70)	-4.82* (-1.75)	0.148 (0.98)	0.065 (0.77)
ENV _{Concerns}	0,085*** (3.99)	13.63*** (3.19)	-0.229** (-2.34)	-0.215*** (-3.86)
Adj. R ² / Pseudo R ²	0.68	0.53	0.35	0.26
# Observations	954	975	1,047	4,097

Robustness checks

- Regressions using an overall environmental performance measure
 - Regressions using non-logarithmic bond spreads
 - Marginal effects analysis for credit ratings
 - Additional controls and tests for the influence of industry membership
 - Clustering of standard errors using different dimensions
- *Findings robust to all of the abovementioned tests*

Implications for banks and borrowing firms

- Conceptual framework and findings extendable to banks
 - Additional risk due to media exposure and lender liability (CERCLA)
 - Effect of bank initiatives on the cost of capital (Equator Principles, CERES)
 - Similar findings in follow-up study on bank loans (Chava, 2011)
- Credit analysis:
 - Requires country-specific knowledge of environmental framework
 - Identify existing and potential environmental liabilities
(opaque accounting practices, M&A risks, strategic defaults)
- Environmental delinquents can face both, liquidity constraints and premia

Conclusions

- Environmental management affects firms and their investors:
 - Significant premium on the cost of debt financing
 - Credit rating agencies partially account for environmental risks
 - Environmental effect based on regulated and non-regulated activities
 - Notable increase in significance over recent decade
 - Effect not restricted to or driven by high-risk industries
 - Proactive environmental engagement associated with lower cost of debt
- *Firms with better environmental management pay a lower cost of capital*

Caveats and Challenges

- Crude measures of environmental performance
 - Performance criteria often qualitative in nature
 - Challenge of identifying and covering relevant criteria
 - Restricts the accuracy of estimates, complicates the assessment of risk exposures
 - Offers return opportunities (e.g., information advantage, engagement)
- Unresolved questions:
 - To what degree is environmental risk exposure already priced?
 - Does the environmental risk exposure in supply chains and foreign operations affect the credit risk of borrowing firms?
 - Are SME's exposed to a higher environmental risks?

Robustness Test Results

Results for high-risk industries

	<i>ln(Spread)</i>	<i>ln(Spread)</i>	<i>Bond Rating</i>	<i>Issuer Rating</i>
ENV _{Strengths}	-0.0811*** (-4.24)	-0.0297 (-1.11)	0.1289 (1.21)	0.0017 (0.03)
ENV _{Concerns}	0.0474*** (3.02)	0.0578*** (2.58)	-0.2026* (-1.72)	-0.1341 (-1.19)
ENV _{Strengths} *HighRisk	-0.0144 (-0.38)	-0.0278 (-0.55)	0.1348 (0.96)	0.2074** (2.44)
ENV _{Concerns} * HighRisk	-0.0208 (-1.18)	-0.0285 (-0.88)	0.0060 (0.03)	-0.0170 (-0.12)
HighRisk	-0.1971*** (-2.81)	-0.1912* (-1.88)	0.1792 (0.30)	-0.7395 (-1.50)
BRmod	-0.3255*** (-14.04)			
<i>Year Fixed Effects</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
<i>Industry Fixed Effects</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
Adj. R ² / Pseudo R ²	0.74	0.64	0.34	0.23
# Observations	2,068	2,119	2,242	6,420

* p≤0.1, ** p≤0.05, *** p≤0.01

Results for non-logarithmic yield spreads

	<i>Spread</i>			
	<i>(I.b)</i>	<i>(I.c)</i>	<i>(II.b)</i>	<i>(II.c)</i>
ENV _{Strengths}	-5.0513 (-1.29)	-11.8094*** (-3.50)		
ENV _{Concerns}	8.0024*** (3.03)	5.9395*** (3.04)		
ENV _{Total}			-7.0636*** (-3.79)	-6.6796*** (-4.23)
BRmod		-50.8564*** (-10.33)		-50.8462*** (-10.25)
<i>Year Fixed Effects</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
<i>Industry Fixed Effects</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
Adj. R ²	0.62	0.61	0.62	0.61
# Observations	2,148	2,093	2,148	2,093

* p≤0.1, ** p≤0.05, *** p≤0.01

Marginal effects
analysis:

Bond Ratings

	CCC-D	B	BB	BBB	A	AA	AAA
ENV _{Strengths}	0.0000 (-0.54)	-0.0004 (-1.18)	-0.0106* (-1.87)	-0.0526* (-1.92)	0.0585* (1.94)	0.0050 (1.63)	0.0001 (0.79)
ENV _{Concerns}	0.0000 (0.54)	0.0004 (1.12)	0.0126** (2.00)	0.0625** (2.18)	-0.0695** (-2.20)	-0.0060* (-1.72)	-0.0001 (-0.86)
Leverage	0.0000 (0.63)	0.0000* (1.67)	0.0011*** (3.51)	0.0053*** (3.73)	-0.0059*** (-3.77)	-0.000***5 (-3.22)	0.0000 (-0.94)
Size	0.0000 (-0.66)	-0.0013* (-1.66)	-0.0403*** (-5.40)	-0.2001*** (-5.29)	0.2224*** (5.47)	0.0191*** (4.50)	0.0002 (0.96)
Capital Intensity	0.0000 (-0.60)	0.0000 (-1.43)	-0.0005*** (-3.47)	-0.0023*** (-3.02)	0.0025*** (3.15)	0.0002** (2.57)	0.0000 (1.05)
Interest Coverage	0.0000 (-0.63)	-0.0001* (-1.71)	-0.0021** (-2.47)	-0.0105** (-2.22)	0.0116** (2.25)	0.0010** (2.56)	0.0000 (0.92)
ROA	0.0000 (-0.63)	-0.0002 (-1.37)	-0.0049*** (-3.47)	-0.0242*** (-4.11)	0.0269*** (4.17)	0.0023*** (2.83)	0.0000 (0.91)
Loss ⁺	0.0001 (0.52)	0.0107 (1.12)	0.1366** (2.43)	0.1633*** (7.98)	-0.2983*** (-5.98)	-0.0123*** (-2.97)	-0.0001 (-0.86)
Subordinated ⁺	0.0003 (0.64)	0.0239 (1.17)	0.2151** (2.53)	0.1253** (2.03)	-0.3517*** (-8.06)	-0.0127*** (-3.12)	-0.0001 (-0.85)
Time-to-maturity	0.0000 (-0.55)	0.0000 (-1.15)	-0.0004** (-1.97)	-0.0022** (-2.34)	0.0025** (2.35)	0.0002* (1.65)	0.0000 (0.89)
Issue size	0.0000 (0.00)	0.0000 (0.00)	0.0000 (0.00)	-0.0001 (0.00)	0.0001 (0.00)	0.0000 (0.00)	0.0000 (0.00)

*** p<0.01, ** p<0.05, * p<0.1

⁺ dy/dx is for a discrete change of dummy variable from 0 to 1

Marginal effects
analysis:

Issuer Ratings

	CCC-D	B	BB	BBB	A	AA	AAA
ENV _{Strengths}	0.0000 (-1.31)	-0.0105 (-1.50)	-0.0180 (-1.45)	0.0089 (1.38)	0.0183 (1.52)	0.0013 (1.31)	0.0001 (1.23)
ENV _{Concerns}	0.0001 (1.06)	0.0206* (1.89)	0.0353** (2.18)	-0.0175** (-2.15)	-0.0358** (-2.04)	-0.0025 (-1.63)	-0.0002 (-1.09)
Leverage	0.0000 (1.29)	0.0015*** (3.69)	0.0025*** (3.47)	-0.0012*** (-3.18)	-0.0025*** (-3.75)	-0.0002*** (-2.64)	0.0000 (-1.52)
Size	-0.0004 (-1.31)	-0.0789*** (-8.71)	-0.1352*** (-7.36)	0.0670*** (5.31)	0.1369*** (11.83)	0.0096*** (3.24)	0.0009 (1.45)
Capital Intensity	0.0000 (-1.10)	-0.0006*** (-3.45)	-0.0011*** (-3.31)	0.0005*** (3.19)	0.0011*** (3.43)	0.0001** (2.56)	0.0000 (1.26)
Interest Coverage	0.0000 (-0.53)	-0.0001 (-0.50)	-0.0002 (-0.51)	0.0001 (0.51)	0.0002 (0.51)	0.0000 (0.49)	0.0000 (0.44)
ROA	0.0000 (-1.30)	-0.0080*** (-6.26)	-0.0137*** (-9.93)	0.0068*** (6.60)	0.0139*** (9.82)	0.0010*** (2.94)	0.0001 (1.40)
Loss ⁺	0.0005 (1.13)	0.0697*** (4.85)	0.0841*** (5.06)	-0.0669*** (-3.93)	-0.0824*** (-5.97)	-0.0046*** (-3.31)	-0.0004 (-1.34)
Subordinated ⁺	0.0004 (1.22)	0.0584*** (3.79)	0.0799*** (4.17)	-0.0545*** (-3.42)	-0.0790*** (-4.39)	-0.0048*** (-3.13)	-0.0004 (-1.47)

*** p≤0.01, ** p≤0.05, * p≤0.1

⁺ dy/dx is for a discrete change of dummy variable from 0 to 1

Overall environmental performance results

	<i>ln(Spread)</i>	<i>Bond Rating</i>	<i>Issuer Rating</i>
ENV _{Total}	-0.0459*** (-5.39)	0.1826** (2.55)	0.1239*** (2.85)
BRmod	-0.3257*** (-14.13)		
<i>Year Fixed Effects</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
<i>Industry Fixed Effects</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
Adj. R ² / Pseudo R ²	0.74	0.34	0.23
# Observations	2,068	2,242	6,420

*** p≤0.01, ** p≤0.05, * p≤0.1

Appendix

KLD performance ratings (“Strengths”)

Panel A: Performance Strength Indicators, *ENV Strengths*

<i>Beneficial Products and Services</i>	The company derives substantial revenues from innovative remediation products, environmental services, or products with environmental benefits. (The term “environmental service” excludes services with questionable environmental effects, such as landfills, incinerators, waste-to-energy plants, and deep injection wells.)
<i>Pollution Prevention</i>	The company has notably strong pollution prevention programs including both emissions reductions and toxic-use reduction programs.
<i>Recycling</i>	The company either is a substantial user of recycled materials as raw materials in its manufacturing processes, or a major factor in the recycling industry.
<i>Clean Energy</i>	The company has taken significant measures to reduce its impact on climate change and air pollution through use of renewable energy and clean fuels or through energy efficiency. The company has demonstrated a commitment to promoting climate-friendly policies and practices outside its own operations.
<i>Other Strength</i>	The company has demonstrated a superior commitment to management systems, voluntary programs, or other environmentally proactive activities.

KLD performance ratings (“Concerns”)

Panel B: Performance Concern Indicators, *ENV* Concerns

<i>Hazardous Waste</i>	The company’s liabilities for hazardous waste sites exceed \$50 million, or the company has recently paid substantial fines or civil penalties for waste management violations.
<i>Regulatory Problems</i>	The company has recently paid substantial fines or civil penalties for violations of air, water, or other environmental regulations, or it has a pattern of regulatory controversies under the Clean Air Act, Clean Water Act or other major environmental regulations.
<i>Substantial Emissions</i>	The company’s legal emissions of toxic chemicals (as defined by and reported to the EPA) from individual plants into the air and water are among the highest of the companies followed by KLD.
<i>Agricultural Chemicals</i>	The company is a substantial producer of agricultural chemicals, i.e., pesticides or chemical fertilizers.
<i>Climate Change</i>	The company derives substantial revenues from the sale of coal or oil and its derivative fuel products, or the company derives substantial revenues indirectly from the combustion of coal or oil and its derivative fuel products. Such companies include electric utilities, transportation companies with fleets of vehicles, auto and truck manufacturers, and other transportation equipment companies. In 1999, KLD added the climate Change Concern.
<i>Other Concern</i>	The company has been involved in an environmental controversy that is not covered by other KLD ratings.

Descriptive statistics

Variable	# Obs.	Mean	Std. Dev.	Median	Min	Max
<i>Environmental Performance</i>						
ENV _{Strengths}	2,242	0.30	0.59	0	0	4
ENV _{Concerns}	2,242	0.67	1.06	0	0	5
ENV _{Total}	2,242	-0.37	1.07	0	-4	4
<i>Credit Risk Measures</i>						
Spread (in bp)	2,119	149.85	104.59	120	3	945
Bond Rating	2,242	4.41	0.93	4	1	7
Issuer Rating	6,420	3.73	1.18	4	1	7
<i>Issuer Specific Controls</i>						
Leverage (%)	2,242	69.38	15.18	68.62	36.08	123.09
Size (in BM\$)	2,242	39.21	93.63	12.54	0.28	979.41
Capital Intensity (%)	2,242	57.64	40.28	53.82	0.06	174.85
Interest Coverage	2,242	9.17	8.99	6.21	-1.51	45.96
ROA (%)	2,242	4.23	4.59	3.64	-21.73	15.76
Loss	2,242	0.03	0.18	0	0	1
<i>Issue Specific Controls</i>						
Subordinated	2,242	0.02	0.15	0	0	1
TTM (in years)	2,242	12.50	11.85	10	0.25	100
Issue Size (in MM\$)	2,242	438.66	399.14	300	10	2,500
Speculative	2,242	0.13	0.34	0	0	1

Conversion schedule for credit ratings

Panel A: Recoding Schedule for Rating Classifications

<i>Moody's Rating</i>	<i>S&P Rating</i>	<i>Compustat (data280)</i>	<i>Assigned Rating Code</i>	<i>Rating Grade</i>
Aaa	AAA	2	7	Investment
Aa1	AA+	4	6	Investment
Aa2	AA	5	6	Investment
Aa3	AA-	6	6	Investment
A1	A+	7	5	Investment
A2	A	8	5	Investment
A3	A-	9	5	Investment
Baa1	BBB+	10	4	Investment
Baa2	BBB	11	4	Investment
Baa3	BBB-	12	4	Investment
B1	BB+	13	3	Speculative
B2	BB	14	3	Speculative
B3	BB-	15	3	Speculative
B	B+	16	2	Speculative
B2	B	17	2	Speculative
B3	B-	18	2	Speculative
Caa1	CCC+	19	1	Speculative
Caa2	CCC	20	1	Speculative
Caa3	CCC-	21	1	Speculative
Ca	CC	23	1	Speculative
C	D, SD	27, 29	1	Speculative

Credit rating distribution

Panel B: Distributions of Bond and Issuer Ratings

<i>Assigned Rating Code</i>	<i>Bond Rating</i>	<i>Issuer Rating</i>
7 (AAA)	1.41 %	0.75 %
6 (AA ⁺ to AA ⁻)	8.34 %	16.94 %
5 (A ⁺ to A ⁻)	36.47 %	26.85 %
4 (BBB ⁺ to BBB ⁻)	40.44 %	29.17 %
3 (BB ⁺ to BB ⁻)	10.11 %	21.96 %
2 (B ⁺ to B ⁻)	2.78 %	3.25 %
1 (CCC ⁺ to D)	0.44 %	1.08 %
# <i>Observations</i>	2,256	5,568