

Does *Newsweek's* Green Ranking
Reflect the Pollution Emissions as
Measured by TRI/RSEI?

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Outline of Discussion

- Purpose of the Original Study
- *Newsweek's* Approach and Methodology
- Using TRI/RSEI in prior studies
- TRI/RSEI in current study
- The potential of TRI/RSEI in future studies

Purpose of Original Study

- *Newsweek's* adopted role
- Firms that are major producers of chemical emissions
- Correlation between *Newsweek's* findings and TRI

Environmental Impact Score

- Environmental Impact Score (EIS):
 1. Public available pollution information
 2. Estimating pollution data using an input-output model
 3. Determining environmental impacts per total economic output
 4. Disclosure score (10 percent)

Newsweek's Methodology

- Green Policy Score (GPS):
- Over 70 individual indicators divided into 5 Areas:
 1. Climate change policies and performance
 2. Pollution policies and performance
 3. Product impact
 4. Environmental stewardship
 5. Management of environmental issues
- Reputational survey score (RSS):
- Survey of users of corporate register.com

Newsweek's Methodology

- Overall Green Score (GS)

$$\begin{array}{ccccccc} \mathbf{GS} & = & \mathbf{EIS} & + & \mathbf{GPS} & + & \mathbf{RSS} \\ 100\% & & 45\% & & 45\% & & 10\% \end{array}$$

TRI and Prior Studies

- Freedman and Patten (2004)-use 1987 TRI in lbs.
- Freedman and Stagliano (2008)-2002 TRI data in lbs
- Cho, Freedman and Patten (2012)-2002 TRI data from PERI—lbs.

Hypotheses

- H1: Green Ranking is not correlated with pollution performance.
 - H1a: GS is not correlated with pollution performance;
 - H1b: EIS is not correlated with pollution performance;
 - H1c: GPPS is not correlated with pollution performance;
 - H1d: RSS is not correlated with pollution performance;

Hypotheses

- H2: The correlation between green ranking and pollution performance is equally significant.
 - H2a: The correlation between GS and pollution performance is equally significant.
 - H2a: The correlation between EIS and pollution performance is equally significant.

Sample

- Start with *Newsweek's* List
- Include those firms that are in highly polluting industries based on *Newsweek's* system of classification (171 firms):
 - Basic Materials
 - General Industrial
 - Industrial goods
 - Oil and Gas
 - Utilities
- Included in COMPUSTAT
- Included in TRI/RSEI
- Result: 127 firms

Models

$$(Green\ Ranking\ Scores) = \alpha + \beta * (risk\ measures) + \gamma * SIZE + \varepsilon$$

$$(Green\ Ranking\ Scores) = \alpha + \beta_1 - \beta_4 * (risk\ measure * Ind_sector_dummies) + \gamma * SIZE + \varepsilon$$

GS	Overall Green Score.
EIS	Environmental Impact Score.
GPPS	Green Policy and Procedure Score
RSS	Reputation Survey Score
PBR	2008 TRI releases in millions of lbs; Natural log.
PTBR	PBR* Toxicity. Natural log.
MHPR	PTBR * population (H*P), aggregated by facility (plant) and then by firm in 2008. Natural log.
RRR	Risk-related results, aggregated by facility (plant) and then by firm in 2008.

BasicM	Dummy Variable for the basic materials sector. One (1) if a firm is in the sector: zero (0) otherwise.
General	Dummy Variable for the general industrial sector. One (1) if a firm is in the sector: zero (0) otherwise.
IndGoods	Dummy Variable for the industrial goods sector. One (1) if a firm is in the sector: zero (0) otherwise.
OilGas	Dummy Variable for the oil and gas sector. One (1) if a firm is in the sector: zero (0) otherwise.
Util	Dummy Variable for the utilities sector. One (1) if a firm is in the sector: zero (0) otherwise.
SIZE	Natural log of total assets.

Results – Sample Descriptive

SECT	cnt	RANK_H	RANK_MEAN	RANK_L
Basic Materials	27	80	300	500
General Industrials	24	30	228	484
Industrial Goods	28	37	256	459
Oil and Gas	20	100	278	425
Utilities	28	66	410	499
Pooled	127	37	297	500

VARIABLE	n	mean	stddev	min	median	max
Panel A: Pooled						
GS	127	66.035	12.940	1.000	68.110	83.820
EIS	127	22.869	15.806	0.200	22.200	72.700
GPPS	127	39.075	15.599	4.590	38.450	72.350
RSS	127	36.295	10.765	8.860	34.580	94.300
PBR	127	5.377	2.361	-3.546	5.706	9.536
PTBR	127	17.791	4.555	5.391	19.184	25.629
MHPR	125	25.621	4.463	-5.964	26.529	30.668
RRR	127	44.983	91.346	0.000	8.088	511.149
SIZE	127	9.436	1.004	7.832	9.391	13.131

Results - Correlation

Variable	GS	EIS	GPPS	RSS	PBR	PTBR	MHPR	RRR	SIZE
Panel A: Pooled									
GS	.	0.525 ****	0.582 ****	0.214 **	-0.291 ***	-0.130	-0.286 ***	-0.066	-0.006
EIS	0.489 ****	.	-0.049	-0.043	-0.442 ****	-0.095	-0.484 ****	-0.033	0.030
GPPS	0.723 ****	-0.085	.	0.309 ****	0.063	0.041	-0.052	-0.017	-0.026
RSS	0.284 ***	-0.102	0.345 ****	.	0.092	0.209 **	0.147	-0.040	0.341 ****
PBR	-0.267 ***	-0.511 ****	0.085	0.085	.	0.582 ****	0.607 ****	0.205 **	-0.034
PTBR	-0.083	-0.077	0.058	0.156 *	0.582 ****	.	0.472 ****	0.271 ***	0.129
MHPR	-0.310 ****	-0.459 ****	-0.002	0.069	0.580 ****	0.438 ****	.	0.383 ****	0.141
RRR	-0.127	-0.213 **	-0.023	0.067	0.490 ****	0.476 ****	0.891 ****	.	-0.147
SIZE	-0.019	-0.023	-0.001	0.318	0.010	0.148	0.099	0.086	.

Panel A: GS						Panel C: GPPS					
Intercept	81.223	76.387	71.348	82.016	68.607	Intercept	45.850	40.199	40.868	46.230	43.438
	7.780	7.790	7.010	7.870	6.860		3.130	2.950	2.990	3.180	3.250
	****	****	****	****	****		***	***	***	***	***
PBR	(1.149)	(1.504)				PBR	0.916	0.427			
	(1.800)	(3.360)					1.020	0.690			
	*	***									
PTBR	0.224		(0.339)			PTBR	0.119		0.157		
	0.780		(1.450)				0.290		0.500		
MHPR	(0.537)			(0.754)		MHPR	(0.519)			(0.172)	
	(1.730)			(3.320)			(1.190)			(0.540)	
	*			***							
RRR	0.005				(0.009)	RRR	0.001				(0.004)
	0.370				(0.750)		0.030				(0.230)
SIZE	0.108	(0.187)	0.121	0.396	(0.189)	SIZE	(0.067)	(0.367)	(0.489)	(0.292)	(0.446)
	0.100	(0.190)	0.120	0.400	(0.180)		(0.040)	(0.270)	(0.350)	(0.210)	(0.320)
F	0.015	0.005	0.353	0.005	0.751	F	0.828	0.759	0.847	0.827	0.934
Adj. R2	0.073	0.070	0.001	0.068	(0.012)	Adj. R2	(0.024)	(0.012)	(0.014)	(0.013)	(0.015)
R2	0.110	0.085	0.017	0.083	0.005	R2	0.018	0.005	0.003	0.003	0.001
Panel B: EIS						Panel D: RSS					
Intercept	49.547	37.457	22.820	52.978	19.280	Intercept	(4.406)	(1.336)	(3.305)	(3.067)	1.536
	4.110	3.010	1.650	4.130	1.420		(0.460)	(0.150)	(0.370)	(0.320)	0.170
	****	***		****							
PBR	(2.414)	(3.089)				PBR	(0.099)	0.500			
	(3.270)	(5.430)					(0.170)	1.230			
	***	****									
PTBR	0.978		(0.353)			PTBR	0.410		0.404		
	2.940		(1.110)				1.560		1.980		
	***								**		
MHPR	(1.671)			(1.749)		MHPR	0.145			0.244	
	(4.650)			(6.270)			0.510			1.180	
	****			****							
RRR	0.026				(0.005)	RRR	(0.007)				0.001
	1.860				(0.320)		(0.630)				0.120
	*										
SIZE	1.125	0.238	0.673	1.560	0.405	SIZE	3.223	3.688	3.420	3.499	3.667
	0.920	0.190	0.480	1.270	0.290		3.330	4.080	3.790	3.830	3.990
							***	****	****	****	****
F	0.000	0.000	0.513	0.000	0.897	F	0.002	0.000	0.000	0.000	0.001
Adj. R2	0.326	0.183	(0.005)	0.232	(0.015)	Adj. R2	0.112	0.113	0.130	0.112	0.102
R2	0.354	0.196	0.011	0.244	0.002	R2	0.148	0.127	0.144	0.127	0.117

OLS: Pooled Sample

OLS: Cross-Sector

Model	Intercept	BasicM	General	IndGoods	OilGas	Util	SIZE	F	R2	Adj_R2
Panel A: GS										
PBR	68.708	(0.235)	0.630	0.166	0.011	(2.499)	0.087	16.516	0.456	0.429
	8.480	(0.580)	1.250	0.310	0.020	(6.460)	0.110			
	****					****				
PTBR	69.887	(0.095)	0.157	0.013	0.015	(0.842)	(0.015)	11.976	0.378	0.347
	8.060	(0.450)	0.710	0.070	0.060	(4.170)	(0.020)			
	****					****				
MHPR	72.810	(0.336)	(0.165)	(0.268)	(0.288)	(0.801)	0.398	11.258	0.364	0.332
	7.700	(1.610)	(0.770)	(1.190)	(1.260)	(4.100)	0.430			
	****					****				
RRR	63.260	0.022	0.013	(0.003)	0.005	(0.165)	0.446	6.703	0.254	0.216
	7.080	0.880	0.930	(0.150)	0.170	(6.070)	0.480			
	****					****				
Panel B: EIS										
PBR	23.929	(2.296)	(0.259)	0.926	(0.618)	(3.539)	0.717	22.382	0.532	0.509
	2.350	(4.510)	(0.410)	1.360	(0.720)	(7.280)	0.690			
	**	****				****				
PTBR	19.593	(0.522)	0.219	0.507	0.100	(1.067)	0.713	20.954	0.516	0.491
	1.890	(2.080)	0.820	2.080	0.350	(4.420)	0.660			
	*	**		**		****				
MHPR	35.775	(1.384)	(0.860)	(0.606)	(0.957)	(1.603)	1.653	30.467	0.608	0.588
	3.550	(6.260)	(3.770)	(2.530)	(3.940)	(7.720)	1.680			
	****	****	****	**	****	****	*			
RRR	10.970	(0.073)	0.018	0.049	0.021	(0.150)	1.409	3.912	0.166	0.123
	0.860	(2.090)	0.890	1.660	0.490	(3.850)	1.050			
		**		*		****				

OLS: Cross-Sector (cont'd)

Model	Intercept	BasicM	General	ndGoods	OilGas	Util	SIZE	F	R2	Adj_R2
Panel C: GPPS										
PBR	35.413	0.428	1.234	(0.299)	(0.527)	0.125	0.245	0.891	0.043	(0.005)
	2.470	0.600	1.390	(0.310)	(0.440)	0.180	0.170			
	**									
PTBR	37.684	0.279	0.422	(0.049)	0.046	0.217	(0.198)	0.846	0.041	(0.008)
	2.620	0.800	1.140	(0.150)	0.120	0.650	(0.130)			

MHPR	44.032	(0.248)	(0.176)	(0.528)	(0.498)	(0.281)	0.393	1.066	0.051	0.003
	2.850	(0.730)	(0.500)	(1.440)	(1.340)	(0.880)	0.260			

RRR	45.468	0.051	0.007	(0.056)	(0.027)	0.003	(0.691)	1.005	0.049	0.000
	3.380	1.370	0.350	(1.790)	(0.610)	0.060	(0.490)			
	****			*						
Panel D: RSS										
PBR	(10.134)	0.344	1.324	0.203	(1.076)	0.242	4.734	5.555	0.220	0.181
	(1.120)	0.760	2.360	0.340	(1.410)	0.560	5.090			
			**				****			
PTBR	(12.208)	0.410	0.707	0.314	0.039	0.391	4.408	6.326	0.243	0.205
	(1.370)	1.890	3.080	1.500	0.160	1.880	4.740			
		*	***			*	****			
MHPR	(13.001)	0.183	0.359	0.133	(0.114)	0.170	4.789	5.672	0.224	0.184
	(1.330)	0.860	1.620	0.570	(0.480)	0.850	5.020			

RRR	1.518	0.011	0.001	0.001	(0.013)	0.003	3.662	2.676	0.120	0.075
	0.170	0.460	0.080	0.030	(0.420)	0.120	3.850			

ANOVA, Between-Sector Score Diff.

Panel A				Panel B			
Dependent	FValue	ProbF	RSquare	Dependent	FValue	ProbF	RSquare
GS	10.202	0.000	0.251	PBR	4.2453	0.0030	0.1222
EIS	30.590	0.000	0.501	PTBR	1.0266	0.3964	0.0326
GPPS	0.713	0.585	0.023	MHPR	3.2763	0.0138	0.0985
RSS	1.137	0.342	0.036	RRR	0.8332	0.5066	0.0266
Panel C							
Dependent	Index	Sector	1	2	3	4	5
GS	1	Basic Materials					**
GS	2	General Industrials					**
GS	3	Industrial Goods					**
GS	4	Oil and Gas					**
GS	5	Utilities					
EIS	1	Basic Materials		**	**	**	**
EIS	2	General Industrials			**		**
EIS	3	Industrial Goods					**
EIS	4	Oil and Gas					**
EIS	5	Utilities					
GPPS	1	Basic Materials					
GPPS	2	General Industrials					
GPPS	3	Industrial Goods					
GPPS	4	Oil and Gas					
GPPS	5	Utilities					
RSS	1	Basic Materials					
RSS	2	General Industrials					
RSS	3	Industrial Goods					
RSS	4	Oil and Gas					
RSS	5	Utilities					

ANOVA, Between-Sector Release Diff.

Panel D							
Dependent	Index	Sector	1	2	3	4	5
PBR	1	Basic Materials				**	
PBR	2	General Industrials					
PBR	3	Industrial Goods					
PBR	4	Oil and Gas					**
PBR	5	Utilities					
PTBR	1	Basic Materials					
PTBR	2	General Industrials					
PTBR	3	Industrial Goods					
PTBR	4	Oil and Gas					
PTBR	5	Utilities					
MHPR	1	Basic Materials					
MHPR	2	General Industrials					
MHPR	3	Industrial Goods					**
MHPR	4	Oil and Gas					
MHPR	5	Utilities					
RRR	1	Basic Materials					
RRR	2	General Industrials					
RRR	3	Industrial Goods					
RRR	4	Oil and Gas					
RRR	5	Utilities					

Conclusion

- PBR and MHPR are positive association with the Green Score provided by *Newsweek*.
 - Green Score can capture the information about the amount of pollution (in volume/pounds) and population exposure.
 - Toxicity is overlooked.
- Utilities seem to be the only industry that is consistently ranked by *Newsweek* and the various measures of TRI.
- Scores based on reputation are directly related to size.
- For some industries, firms that pollute more are ranked higher.
- Overall, we think *Newsweek* should be praised for their efforts in assessing pollution performance.

Side Notes on TRI/RSEI

- Existent literature relies heavily on the aggregate pounds in TRI.
- Typically the studies utilize data aggregators/brokers such as RTKnet (<http://ww.rtknet.org>).
- *It makes an impression that the atomic elements of TRI is at facility (plant) level, and*
- *Weight/volume is the only measure (over looking toxicity and population exposure, etc.)*

Side Notes on TRI/RSEI (cont'd)

- So the richness of TRI/RSEI is yet to be explored.
- Issues:
 - Aggregation
 - Link to other databases
 - Make use of risk-based measures (RSEI)
- What we have been doing:

Use Risk-based Measures

- Hierarchy of TRI aggregation:
 1. Firm-level
 2. Facility-level
 3. Process-level
 4. Each chemical release (element)
- Risk-based measures must use level four data with toxicity (EPA) and population (US census, matched with each facility location), etc.
- RRR is provided by EPA.

Use Risk-based Measures (Cont'd)

- RBM must be first calculated for each *element* per year.
- It can be then aggregated up the hierarchies.
- Aggregation:
 - RBM's can be aggregated up to the facility level by utilizing EPA internally assigned IDs/keys.
 - At firm level, match between facilities and firms must be carried out.

Aggregation

- A semi-automated heuristic system is used to do the matches.
 - Exact and proximate match of names
 - Match of EPA internal IDs
 - Geographical location, facility contact info are used to validate the results
 - Calibration by human experts
 - Iterations
 - Identified more matches than does rtknet.org

And More.....

- Better normalization of TRI dataset (Essentially EPA form R)
- Build linkage between TRI, abatement/reduction activities, enforcement/compliance cases, RCRA, SuperFund, etc.
- Ultimately a completely normalized database of all EPA data stored in a relational database or SAS datasets (essentially database tables).