

Do State Pollution Rankings Affect Facility Emissions?

Evidence From The U.S. Toxic Release Inventory, by Jason Scorse

<http://are.berkeley.edu/~sberto/TRI-Draft.pdf>

For eep142 lecture presentation

Based on presentation by Kyriakos Drivas and Erick Gong

“Right to Know” Programs

- Coase Theorem
- Asymmetric information leads to inefficient outcomes (externalities)
- High transaction costs associated with collecting data
- Solution: ***Right to Know Programs***
- Government mandates private firms to release environmental data
- Importance:
 - Decreasing information asymmetries can lead to a reduction in externalities

Toxic Release Inventory (TRI)

- *Emergency Planning and Community Right to Know Act (EPCRA) (1986)*
 - EPCRA Section 313: Firms required to disclose their chemical emissions
- Coverage: Water and air emissions; 667 chemicals listed
- Overall 20,000 TRI facilities covered nationwide

Rank	Facility	City	Pounds
1	<u>SHELL OIL PRODS. U.S. MARTINEZ REFY.</u>	MARTINEZ	1,142,142
2	<u>TESORO REFINING & MARKETING CO.</u>	MARTINEZ	1,064,658
3	<u>CHEVRON PRODS. CO. RICHMOND REFY.</u>	RICHMOND	999,328
4	<u>CONOCOPHILLIPS SAN FRANCISCO REFY.</u>	RODEO	415,112
5	<u>C&H SUGAR CO. INC.</u>	CROCKETT	302,100
6	<u>CONOCOPHILLIPS CARBON PLANT</u>	RODEO	157,380
7	<u>DOW CHEMICAL CO.</u>	PITTSBURG	76,386
8	<u>USS-POSCO INDS.</u>	PITTSBURG	39,840
9	<u>AIRGAS DRY ICE</u>	RICHMOND	35,496
10	<u>BOC GASES</u>	RICHMOND	29,903
11	<u>SILGAN CONTAINERS MFG. CORP.</u>	ANTIOCH	20,236
12	<u>CRITERION CATALYSTS & TECHS. L.P.</u>	PITTSBURG	16,969
13	<u>BP RICHMOND TERMINAL</u>	RICHMOND	11,892
14	<u>MARBLE SHOP INC.</u>	PITTSBURG	10,671
15	<u>RHODIA INC.</u>	MARTINEZ	9,123
16	<u>CONOCOPHILLIPS RICHMOND TERMINAL</u>	RICHMOND	7,513
17	<u>STEELSCAPE</u>	RICHMOND	7,504
18	<u>GENERAL CHEMICAL CORP.</u>	RICHMOND	6,507
19	<u>SHELL CHEMICAL CO. MARTINEZ CATALYST PLANT</u>	MARTINEZ	6,024
			5,595
20	<u>AIR PRODS. MFG. CORP. MARTINEZ WATERFRONT RD</u>	MARTINEZ	

Reported Environmental Releases from TRI Sources in 2002

Rank	Facility	City	Pounds
1	<u>NEW UNITED MOTOR MFG. INC.</u>	FREMONT	499,459
2	<u>ARCH MIRROR WEST</u>	NEWARK	44,985
3	<u>PACIFIC GALVANIZING INC.</u>	OAKLAND	23,445
4	<u>ACME FIBERGLASS INC.</u>	HAYWARD	14,147
5	<u>U.S. PIPE & FNDY. CO. INC.</u>	UNION CITY	13,995
6	<u>HEXCEL CORP.</u>	LIVERMORE	13,107
7	<u>OWENS-BROCKWAY GLASS CONTAINER INC. PLANT #20</u>	OAKLAND	12,179
8	<u>ISOLA LAMINATE SYS. CORP.</u>	FREMONT	10,099
9	<u>BORDEN CHEMICAL INC.</u>	FREMONT	8,107
10	<u>OATEY CO.</u>	NEWARK	7,200
11	<u>AXT INC.</u>	FREMONT	7,097
12	<u>ENGINEERED POLYMER SOLUTIONS INC. (DBA VALSPAR COATINGS)</u>	HAYWARD	4,409
13	<u>CLEVELAND STEEL CONTAINER CORP.</u>	OAKLAND	3,900
14	<u>U.S. DOE LLNL EXPERIMENTAL TEST SITE (SITE 300)</u>	TRACY	3,899
15	<u>WYMAN GORDON CO.</u>	SAN LEANDRO	3,333
16	<u>TRIANGLE COATINGS INC.</u>	SAN LEANDRO	3,288
17	<u>W. R. GRACE & CO. CONN. DAREX CONTAINER PRODS.</u>	SAN LEANDRO	2,327
18	<u>ROHM & HAAS CO.</u>	HAYWARD	2,012
19	<u>GILLIG CORP.</u>	HAYWARD	1,854
20	<u>B & P MARBLE INC.</u>	OAKLAND	1,363

Effects of TRI data

- How does TRI lead to lower pollution?
- Possible Channels:
 - Political pressure
 - Green consumerism
 - Future liability
 - Future expansion

Objective

- We focus on the “Top 10” Polluters lists
- Objective: Examine whether firms alter their toxic emissions based on their state pollution rankings
- Why State Pollution Rankings?
 - Policy reason: Political pressure is more intense in local level
 - Econometric reason: Quasi-Experiment

Methodology: Quasi-Experiment

- First-Best: Randomly create and disclose rankings in different states
- Second-Best: Observe an exogenous shock in state rankings and identify the change in emissions:
 - In 1998 seven additional industries (big polluters) entered the TRI

An Example: CO vs. CT

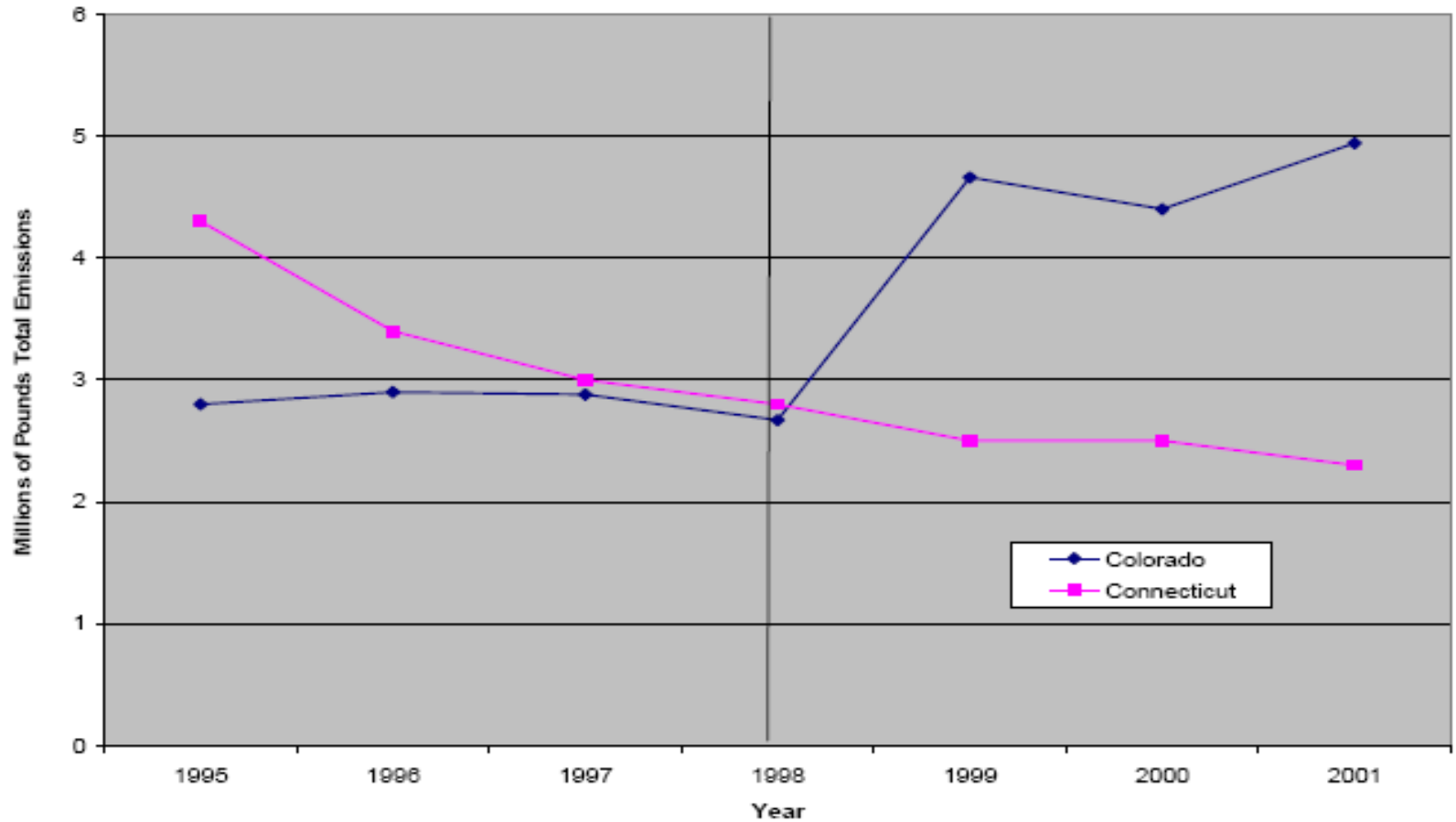
Connecticut 2000-2001

Facility Ranking (Within Original TRI Industries only)	2000		2001	
	Actual State Rank	Exog Change	Actual State Rank	Exog Change
1	1	0	1	0
2	2	0	2	0
3	3	0	3	0
4	4	0	4	0
5	5	0	5	0

Colorado 2000-2001

Facility Ranking (Within Original TRI Industries)	2000		2001	
	Actual State Rank	Exog Change	Actual State Rank	Exog Change
1	8	7	2	1
2	11	9	5	4
3	12	9	9	6
4	13	9	11	7
5	14	9	12	7

An Example: CO vs. CT



Data: An Overview

- For each firm:
 - Total emissions
 - State rankings
 - Various facility-specific characteristics
- Public disclosure takes place a year and a half after the end of any given reporting year
- Top 10 Polluters account for 14-42% of total emissions from 1988-2001

Setup

- Model:
 - $\Delta\text{emissions} = \beta_1 \times \text{BaseRanking} + \beta_2 \times \text{RankChange} + \dots$
- $\Delta\text{emissions} < 0$
- Theory:
 - $\beta_1 > 0$: The higher you are in rankings (bigger polluter), the more you will reduce emissions (negative)
 - $\beta_2 > 0$: The more you will drop in rankings (bigger number), the less you will reduce emissions (negative)

Example

- Firm A is ranked #2 in overall emissions.
- If it's ranking changed from #2 to #15 it will have less incentive to decrease its emissions levels (less public scrutiny), hence B_1 is positive (change in emissions is less OR firm pollutes more)
- If it's ranking change is a positive number (i.e. $15 - 2 = 13$) then multiply $13 * B_2$ to get the increase in emissions

Example

- $\beta_1 > 0$:

	Base_Rank	Δ Emissions
Firm 1	1	-1000
Firm 2	90	-10

- $\beta_2 > 0$:

	Base_Rank	New_Rank	Change	Δ Emissions
Firm 1	1	8	7	-10
Firm 2	1	4	3	-1000

Top 100 State Facilities

	<u>OLS (1-4)</u>				<u>Fixed Effects (5-8)</u>			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Base Ranking (R ^B)	1.1 (.2)***	1.4 (.3)***	.47 (.1)***	.61 (.2)***	2.0 (.3)***	3.8 (.9)***	1.7 (.3)***	1.0 (.7)
Exogenous Change in Ranking (R ^{CH})	5.6 (1.6)***	6.0 (1.6)***	5.4 (1.5)***	5.7 (1.6)***	6.2 (2.0)***	7.6 (2.3)***	6.4 (2.0)***	6.0 (1.8)***
Emissions Change (t-1)	..	-.2 (.1)	..	-.2 (.1)	..	-.4 (.2)**	..	.1 (.04)***
Top 10 Dummy	-157.8 (34.3)***	-184.1 (40.1)***	-136.4 (31.2)***	-90.2 (44.7)**
No. obs	17427	17427	17427	17427	17447	17447	17447	16790
R ²	.05	.07	.05	.08	.003	.002	.005	.003
No. Groups	n/a	n/a	n/a	n/a	4652	4652	4652	4598
SIC dummies	Y	Y	Y	Y	N	N	N	N
State dummies	Y	Y	Y	Y	N	N	N	N
Year dummies	Y	Y	Y	Y	Y	Y	Y	Y

Huber-White Standard Errors Clustered at the Facility Level in (): *= 90% confidence, **=95%, ***=99%

Conclusions

- “Top 10” Polluters List forces these firms to reduce their total emissions
- Decrease in state rankings reduces incentives by firms to reduce their emissions
- Policy Implications:
 - TRI might be a cost-effective way to reduce emissions
 - At each expansion of TRI there will be firms that might increase their emissions

Future Research

- Channels that TRI are working through to reduce pollution

Example of Chemicals Tracked Alameda County 2002

1	<u>GLYCOL ETHERS</u>	182,404
2	<u>XYLENE (MIXED ISOMERS)</u>	114,879
3	<u>N-BUTYL ALCOHOL</u>	65,654
4	<u>TOLUENE</u>	36,854
5	<u>1,2,4-TRIMETHYLBENZENE</u>	34,661
6	<u>METHANOL</u>	33,904
7	<u>AMMONIA</u>	33,227
8	<u>METHYL ISOBUTYL KETONE</u>	32,950
9	<u>ETHYLENE GLYCOL</u>	32,032
10	<u>METHYL ETHYL KETONE</u>	31,122
11	<u>STYRENE</u>	16,871
12	<u>BARIUM COMPOUNDS</u>	11,241
13	<u>M-XYLENE</u>	10,381
14	<u>N,N-DIMETHYLFORMAMIDE</u>	7,003
15	<u>LEAD</u>	5,452
16	<u>ZINC COMPOUNDS</u>	5,106
17	<u>ETHYLBENZENE</u>	5,000
18	<u>CUMENE</u>	4,450
19	<u>N-HEXANE</u>	3,960
20	<u>FORMALDEHYDE</u>	3,542