

Lecture 11:  
Paper overview

**PPHA 34600**  
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## TL;DR:

- ① We can leverage time series data for identification
- ② This is more powerful when combined with cross-section
- ③ The resulting diff-in-diff is one of the better quasi-experiments

# An example: Pollution and housing prices

## Policy issue:

- Pollution is probably bad!
- But how much are we willing to pay to avoid it?

## Approach:

- 1,600 plants emitting toxics opened and closed in the US
- We want to know the effect of pollution on welfare
- Nobody ran an RCT to impact pollution over space...
- ...but many plant openings and closings happened over time

## Estimating the effects of plant openings/closings

The author will run a (simplified) version of:

$$\hat{\tau} = (\bar{Y}(treat, post) - \bar{Y}(treat, pre)) - (\bar{Y}(untreat, post) - \bar{Y}(untreat, pre))$$

Where:

$\bar{Y}$  is the average of the outcome

# Balance

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	Open continuously 1990–2002 (1)	Opened between 1990–2002 (2)	Closed between 1990–2002 (3)
<i>Panel A. Plant characteristics by opening and closing status</i>			
Number of plants	1,846	689	1,062
Average plant employment (total workers)	224	90	114
Average plant age (years)	18.6	2.0	16.2
Mean value of plant equipment (in millions)	\$15.8	\$15.4	\$14.9
Mean value of plant structures (in millions)	\$6.2	\$5.8	\$5.1
Mean annual salary and wages (in millions)	\$11.7	\$5.5	\$6.2
Mean annual toxic emissions (in pounds)	22,016	23,303	17,919

# Balance

	$0 < d \leq 0.5$ (1)	$0.5 < d \leq 1$ (2)	$0 < d \leq 1$ (3)	$1 < d \leq 2$ (4)
<i>Panel B. Community characteristics by distance, d, from plants that opened or closed 1990–2002</i>				
Housing characteristics				
Mean housing value	\$124,424	\$126,492	\$125,927	\$132,227
Aggregate housing value (in millions)	\$38.56	\$60.00	\$98.57	\$174.80
Birth and maternal characteristics				
Mother's education	11.93	12.08	12.05	12.22
Mother's age	26.33	26.50	26.46	26.70
Proportion teenage mother	0.15	0.15	0.15	0.15
Proportion smoker	0.14	0.13	0.13	0.13
Proportion African American	0.23	0.25	0.25	0.26
Proportion Hispanic	0.32	0.30	0.31	0.29
Proportion white/Caucasian	0.72	0.71	0.71	0.70

# Pollution and distance

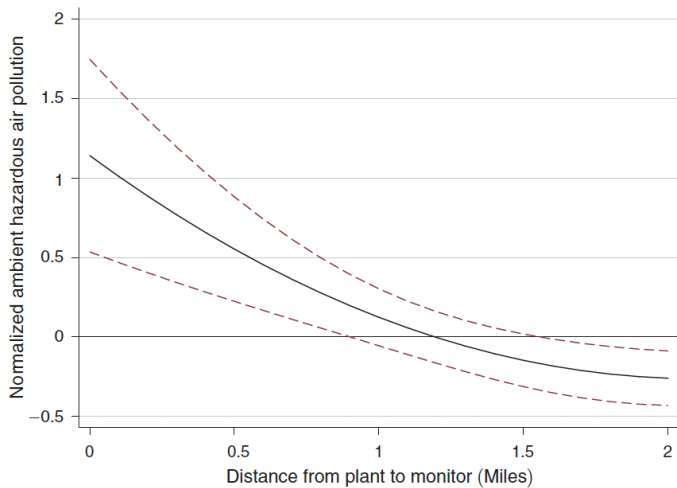


TABLE 4—THE EFFECT OF TOXIC PLANTS ON LOW BIRTHWEIGHT

	0–0.5 Miles		0.5–1 Miles		0–1 Miles		0–1 Miles (+/– 2 years)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Panel A. Estimated effect of plant operation</i>								
1(Plant Operating)	0.0010	0.0012	0.0014**	0.0015**	0.0013**	0.0014**	0.0021**	0.0026***
× Near	(0.0010)	(0.0012)	(0.0006)	(0.0006)	(0.0006)	(0.0007)	(0.0009)	(0.0009)
Observations	88,958	88,958	88,958	88,958	88,958	88,958	63,324	63,324
Plant count	3,438	3,438	3,438	3,438	3,438	3,438	3,438	3,438



# Results

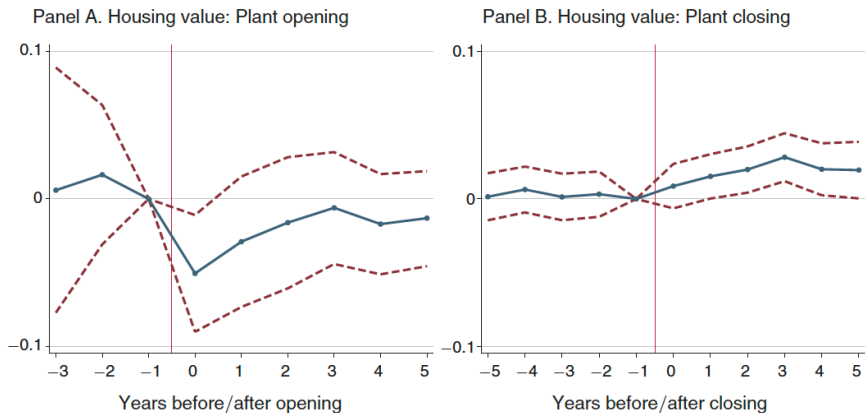


TABLE 2—THE EFFECT OF TOXIC PLANTS ON LOCAL HOUSING VALUES

	0–0.5 Miles		0.5–1 Miles		0–1 Miles		0–1 Miles (+/- 2 years)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Panel A. Estimated effect of plant operation</i>								
1(Plant Operating) × Near	-0.030*** (0.007)	-0.022*** (0.006)	-0.010** (0.005)	-0.012*** (0.004)	-0.015*** (0.005)	-0.014*** (0.004)	-0.009** (0.004)	-0.010*** (0.003)
Observations (plant-distance- year cells)	34,736	34,736	34,736	34,736	34,736	34,736	30,492	30,492
Plant × distance-bin FE	X	X	X	X	X	X	X	X
State × year FE	X		X		X		X	
Plant × year FE		X		X		X		X