Effect of a Garbage Incinerator's Location on Housing Prices

Kiel and McClain (1995) studied the effect that a new garbage incinerator had on housing values in North Andover, Massachusetts. They used many years of data and a fairly complicated econometric analysis. We will use two years of data and some simplified models, but our analysis is similar.

The rumor that a new incinerator would be built in North Andover began after 1978, and construction began in 1981. The incinerator was expected to be in operation soon after the start of construction; the incinerator actually began operating in 1985. We will use data on prices of houses that sold in 1978 and another sample on those that sold in 1981. The hypothesis is that the price of houses located near the incinerator would fall relative to the price of more distant houses.

For illustration, we define a house to be near the incinerator if it is within three miles (variable nearinc=1).

a) **What is the treatment to be evaluated?**
   Efecto de la construcción de un incinerador de basura sobre los precios de tratamiento

b) **Which group could represent the "treatment group" and which the "control group"?**
   Tratamiento: Casas ubicadas cerca del incinerador
   Control: Casas ubicadas lejos del incinerador

c) **Open the data set KIELMC.DTA, what represents each observation? (For example in the injury data each observation represents an individual)**
   La unidad de observación es cada casa

d) **Compare the average price of houses near the incinerator in 1978 and 1981 (use the variable rprice, the price of houses in 1978 dollars)**

1978 or 1981	Summary of price, 1978 dollars		
	Mean	Std. dev.	Freq.
1978	63692.857	42722.027	56
1981	70619.24	34816.795	40

e) **Compare the average price of houses distant from the incinerator in 1978 and 1981. (use the variable rprice, the price of houses in 1978 dollars)**

1978 or 1981	Summary of price, 1978 dollars		
	Mean	Std. dev.	Freq.
1978	82517.228	20831.1	123
1981	101307.51	29741.118	102

f) What is the difference-in-differences estimator?

	Before change	After Change	Difference
Treatment Group = Near incinerator	63 692	70 619	6 927
Control Group = Distant incinerator	101 307	82 517	18 790
Difference in differences =			**-11 863**

g) Demonstrate that the DID estimator in part f) can be also be estimated by running the following regression

$$rprice = \beta_0 + \beta_1 nearinc + \beta_2 y81 + \delta nearinc * y81 + e_{it}$$

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gen post_treatment=y81*nearinc
reg rprice y81 nearinc post_treatment
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Source	SS	df	MS		Number of obs	=	321
					F(3, 317)	=	22.25
Model	6.1055e+10	3	2.0352e+10		Prob > F	=	0.0000
Residual	2.8994e+11	317	914632739		R-squared	=	0.1739
					Adj R-squared	=	0.1661
Total	3.5099e+11	320	1.0969e+09		Root MSE	=	30243

rprice	Coefficient	Std. err.	t	P>|t|	[95% conf. interval]	
y81	18790.29	4050.065	4.64	0.000	10821.88	26758.69
nearinc	-18824.37	4875.322	-3.86	0.000	-28416.45	-9232.293
post_treatment	-11863.9	7456.646	-1.59	0.113	-26534.67	2806.867
_cons	82517.23	2726.91	30.26	0.000	77152.1	87882.36

h) Kiel and McClain (1995) included various housing characteristics in their analysis of the incinerator siting. There are two good reasons for doing this. First, the kinds of houses selling in 1981 might have been systematically different than those selling in 1978; if so, it is important to control for characteristics that might have been different. But just as important, even if the average housing characteristics are the same for both years, including them can greatly reduce the error variance, which can then shrink the standard error of δ.

- **Control for distance to the interstate in feet (intst), land area in feet (land), house area in feet (area), number of rooms (rooms), and number of baths (baths), age of the house (age). What is the coefficient for δ? Is it statistically different from zero?**

	(1) rprice	(2) rprice
y81	18790.3***	12713.6***
	(4.64)	(4.45)
nearinc	-18824.4***	-173.1
	(-3.86)	(-0.04)
post_treat~t	-11863.9	-10769.4**
	(-1.59)	(-2.13)
intst		-0.400**
		(-2.01)
land		0.137***
		(4.31)
area		18.14***
		(7.66)
rooms		4312.5**
		(2.55)
baths		11044.8***
		(4.49)
age		-210.1***
		(-5.01)

```
// g
reg rprice y81 nearinc post_treatment
est store reg1

// h
reg rprice y81 nearinc post_treatment intst land area rooms baths age
est store reg2

esttab reg1 reg2, star(* 0.1 ** 0.05 *** 0.01) r2 ar2
```

i) **Now we want to approximate the percentage reduction in housing value due to the incinerator. Use log(rprice) to estimate the equations above (estimate three equations, one without controls, one with controls as in (h), and one with controls but with log of land (lland), log of area (larea) and log of intst (lintst).**

- Complete: because of a new incinerator, houses near the incinerator lost about _____% in value.

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reg lrprice y81 nearinc post_treatment
est store reg4

reg lrprice y81 nearinc post_treatment intst land area rooms baths age
est store reg5

reg lrprice y81 nearinc post_treatment lintst lland larea rooms baths age
est store reg6

esttab reg4 reg5 reg6, star(* 0.1 ** 0.05 *** 0.01)
```

	(1) lrprice	(2) lrprice	(3) lrprice
y81	0.193***	0.126***	0.152***
	(4.26)	(4.21)	(5.20)
nearinc	-0.340***	-0.0765	0.00679
	(-6.23)	(-1.64)	(0.14)
post_treat~t	-0.0626	-0.0565	-0.0973*
	(-0.75)	(-1.07)	(-1.84)