EDS241: Take-Home Final Exam

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The question for this take-home final exam asks you to examine the impact of the opening of a garbage incinerator on housing values in North Andover, MA. The data for the exercise are a subset of the data in the paper: K.A. Kiel and K.T. McClain (1995): "House Prices During Siting Decision Stages: The Case of an Incinerator from Rumor Through Operation," Journal of Environmental Economics and Management 28, 241-255.

The key variables for the analysis are:

- `rprice` (inflation-adjusted sales price of house)
- `nearinc` (=1 if house located near the incinerator, =0 otherwise)
- `age` (age of the house)
- `land` (square footage of the lot)
- `area` (square footage of the house)
- `rooms` (number of rooms in the house)
- `year` indicator (1978 or 1981).

These variables are contained in the CSV file `KM_EDS241.csv`.

Load Data

```
incinerator_data <- read_csv(here::here("assignments/data/KM_EDS241.csv"))
```

Question A

Using the data for 1981, estimate a simple OLS regression of real house values on the indicator for being located near the incinerator in 1981. What is the house value "penalty" for houses located near the incinerator? Does this estimated coefficient correspond to the 'causal' effect of the incinerator (and the negative amenities that come with it) on housing values? Explain why or why not.

Question B

Using the data for 1978, provide some evidence the location choice of the incinerator was not "random", but rather selected on the basis of house values and characteristics. [Hint: in the 1978 sample, are house values and characteristics balanced by nearinc status?]

Question C

Based on the observed differences in (b), explain why the estimate in (a) is likely to be biased downward (i.e., overstate the negative effect of the incinerator on housing values).

Question D

Use a difference-in-differences (DD) estimator to estimate the causal effect of the incinerator on housing values without controlling for house and lot characteristics. Interpret the magnitude and sign of the estimated DD coefficient.

Question E

Report the 95% confidence interval for the estimate of the causal effect on the incinerator in (d).

Question F

How does your answer in (d) changes when you control for house and lot characteristics? Test the hypothesis that the coefficients on the house and lot characteristics are all jointly equal to 0.

Question G

Using the results from the DD regression in (f), calculate by how much did real housing values change on average between 1978 and 1981

Qustion H

Explain (in words) what is the key assumption underlying the causal interpretation of the DD estimator in the context of the incinerator construction in North Andover.