

ARE 261-B PS 1 (Shapiro)

2021-11-09

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1 Replication

Possible columns: State, Facility Name, Facility ID (ORISPL), Unit ID, Associated Stacks, Date, Year, Program(s), Operating Time, Gross Load (MW-h), Steam Load (1000lb), SO₂ (tons), Avg. NO_x Rate (lb/MMBtu), NO_x (tons), CO₂ (short tons), Heat Input (MMBtu), EPA Region, NERC Region, County, Source Category, Facility Latitude, Facility Longitude, Owner, Operator, Representative (Primary), Representative (Secondary), SO₂ Phase, NO_x Phase, Operating Status, Unit Type, Fuel Type (Primary), Fuel Type (Secondary), SO₂ Control(s), NO_x Control(s), PM Control(s), Hg Control(s)

Come back to think about: - Operating Time - Avg. NO_x Rate (lb/MMBtu) - Heat Input (MMBtu) - Source Category - latitude & longitude - NO_x phase - operating status - unit type, fuel types - pollution controls

These estimates are obtained from an OLS regression of NO_x emissions on six day-of-week indicators and a constant. The values in the graph equal the constant plus the regression residuals, so that the graph depicts fitted values for the reference category (Wednesday).

1.1 Data

Data for NO_x emissions in 2002 and 2005 for states participating in the EPA's Nitrogen Oxides (NO_x) Budget Program (NBP) were downloaded from the EPA's Air Markets Program Data database. Facilities missing NO_x data for a given day that also had measured Operating Time of 0 are assumed to have 0 NO_x for that day.

1.2 Total Daily Average NO_x Emissions Figure 1 depicts total

daily average NO_x emissions over the year, comparing 2002 to 2005 emissions as pre- and post-treatment observations. Even as a simple comparison, there's a dramatic affect on NO_x emissions during the days of the year when the NBP-participating states are required to restrict their emissions.

`## `summarise()` has grouped output by 'day_of_year'. You can override using the `.groups` argument.`

2 Polynomial regression discontinuity

2.1 The econometric equation

$$NOx_t = \beta_0 + \beta_1 \cdot t + \beta_2 \cdot t^2 + \gamma \cdot s + \varepsilon_{t,s}$$

where $t =$

$t =$ is the day of the year (an integer between 1 and 365)

$D_t =$ is the ozone season indicator; 1 if $t \in [121, 273]$ (the ozone season*)

$t =$

$t =$

$NOx_{t,s} =$

*The ozone season is May-September. May 1th, 2005 is the 121st day of the year and September 30th, 2005 is the 273rd day of the year.

2.2 The regressions

```
## Input object size: 9896 bytes; 3 variables 365 observations
## New object size: 7560 bytes; 3 variables 365 observations
```

2.3 Regression Discontinuity at the beginning of the season

2.4 Regression Discontinuity at the end of the season

3 Spline Regression Discontinuity

4 Cross-Sectional Comparison

5 Pre/post differences-in-differences

6 East/west differences-in-differences

7 Differences-in-differences-in-differences

8 Discussion of Estimators

9 EPA emissions caps

10 Marginal Willingness to Pay for Improvements in Air Quality

10.1 First-order Conditions for the Consumer

10.2 Equation (2) [write title of meaning of Eq2]

10.3 ds/dc [write title of meaning of ds/dc]

10.4 Equation (3) [write title of meaning of Eq3]

10.5 Price of (p_a)

11 Figures

Don't know how to automatically pick scale for object of type labelled/integer. Defaulting to continuous

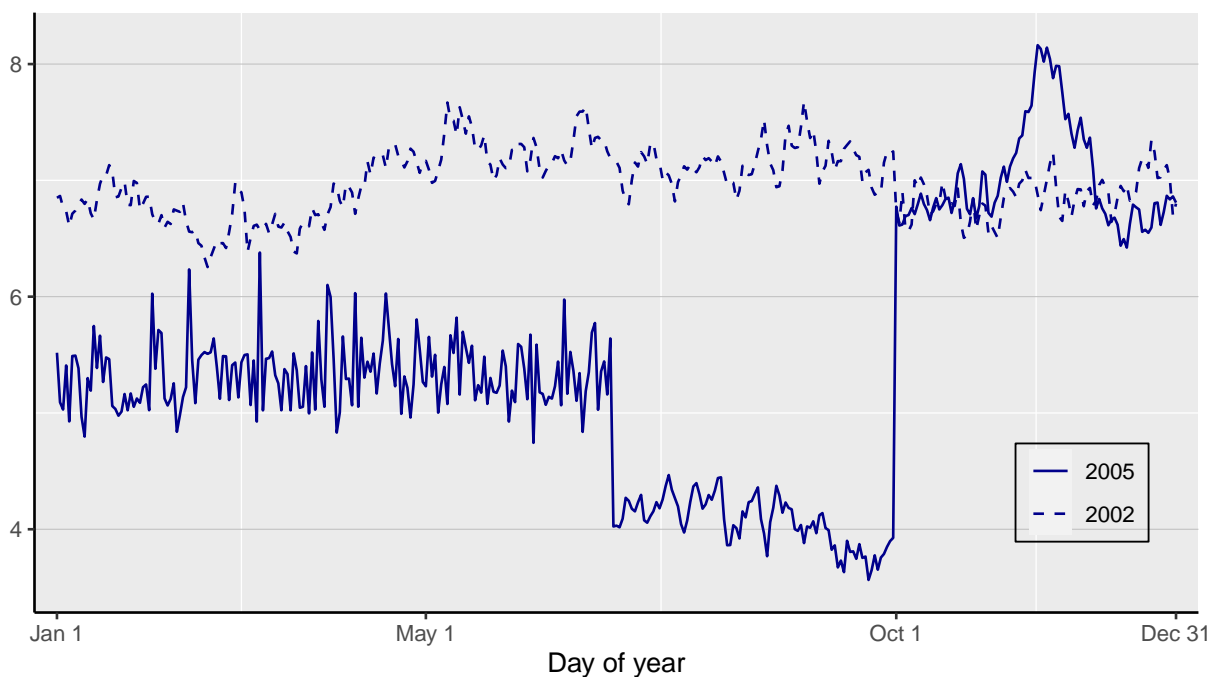


Figure 1: Total Daily NO_x Emissions in the NBP-Participating States

Notes: Figure 1 shows average total daily NO_x emissions (in 1000's of Tons) in the NBP participating states in 2002 and 2005. These estimates are obtained from an OLS regression of NO_x emissions on six day-of-week indicators and a constant. The values in the graph equal the constant plus the regression residuals, so that the graph depicts fitted values for the reference category (Wednesday). Total daily NO_x emissions on y-axis are measured in thousands of tons. The sample includes emissions from all the Acid Rain Units. NBP participating states include: Alabama, Connecticut, Delaware, Illinois, Indiana, Kentucky, Maryland, Massachusetts, Michigan, Missouri, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Rhode Island, South Carolina, Tennessee, Virginia, West Virginia, and Washington, DC. Facilities missing NO_x data for a given day that also had measured Operating Time of 0 are assumed to have 0 NO_x for that day. This slightly affects the regression of NO_x on the day-of-week indicators, but results in very little difference in total sums of daily average NO_x emissions.

12 Code