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. NOx Rate (lb/MMBtu), NOx (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, NOx Phase, Operating Status, Unit Type, Fuel Type (Primary), Fuel Type (Secondary), SO2 Control(s), NOx Control(s), PM Control(s), Hg Control(s)

Come back to think about: - Operating Time - Avg. NOx Rate (lb/MMBtu) - Heat Input (MMBtu) - Source Category - latitude & longitude - NOx 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 emssions 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 1$^{\text{th}}$, 2005 is the 121$^{\text{st}}$ day of the year and September 30$^{\text{th}}$, 2005 is the 273$^{\text{rd}}$ 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 continu
```

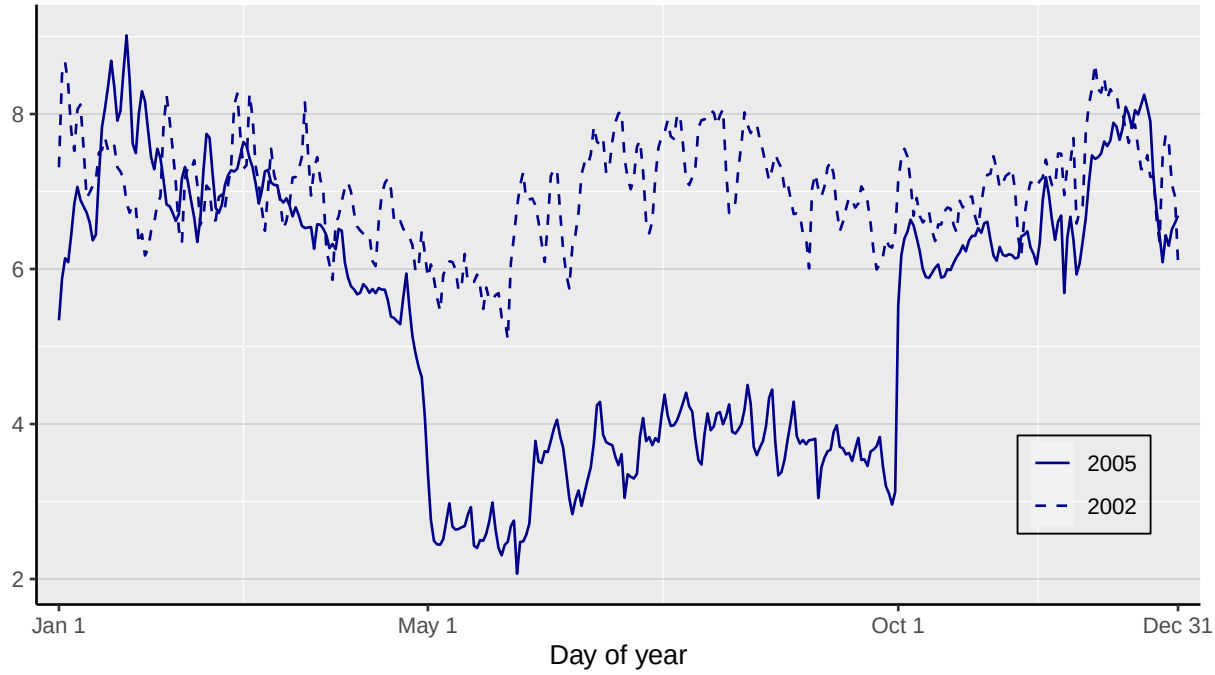

Figure 1: Total Daily NO_x Emissions in the NBP-Participating States

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