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<u>The Impact of Oregon Air Pollution Policy OR S 1541 on State AQI</u>

Our group chose to analyze the policy OR S 1541, which pertains to the issue of toxic air contaminants in the state of Oregon. The policy has a focus on adopting a program and rules "to reduce public health risks from emissions of toxic air contaminants from individual stationary industrial and commercial air contamination sources." The levels of public health risk from potential air contaminants are measured by a benchmark for excess lifetime cancer risk (meaning an excess lifetime cancer risk level of ten in one million). The policy calls for air contamination sources that put public health at risk, to "undertake measures to limit or reduce toxic air contaminant emissions."

Policy OR S 1541 was enacted in 2018, for our groups analysis into the effectiveness of this policy we decided to gather county air quality data for Oregon from the years of 2016, 2018 and 2020. We chose these years so we could understand the air quality in the state of Oregon before the policy, after the policy, and when the policy was enacted.

In our investigation we chose Washington state to act as our control, as it is in a similar geographic region to Oregon. We gathered the county air quality data from Washington for the same years as Oregeon (2016,2018,2020) so we could test if the policy enacted for Oregon made a substantial change in Oregon's air quality compared to the change in air quality for our control state of Washington.

In order to determine if any causal relationship could be established between the policy change and AQI in Oregon we ran a difference in difference analysis with the data gathered from Oregon against the data gathered from Washington.

The difference in difference for Oregon and Washington's AQI is computed by taking the mean of the median AQI reports for all counties in each state before, during, and after the 2018 policy

Difference in Difference Analysis

VARIABLES	(1) medianaqi
treat	0.533
	(2.637)
post	-0.303
	(2.109)
treatXpost	2.067
	(3.447)
Constant	24.10***
	(1.732)
Observations	136
R-squared	0.011

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

change. The pre and post means from Washington are subtracted from those of Oregon to yield the value 2.067. This is the same value as the coefficient for the difference in difference regression above. Unfortunately, the P value for the treatXpost dummy variable is far larger at 0.550 than the acceptable value of alpha 0.05, meaning we cannot assume statistical significance. While causality cannot be determined, it is interesting to note that the mean AQI from Washington decreased by 0.3, while Oregon's increased by 1.76.

After calculating the change in AQI over the three years we used the maptiles function to present the information visually. The first map is from 2018, which was the year that the policy was put in place by the state of Oregon. It is clear from the map that the AQI levels in Washington are already higher than those in Oregon, but our interest was in how the air quality data changed after the policy was put in place.

2018:
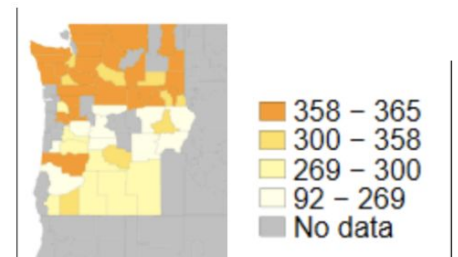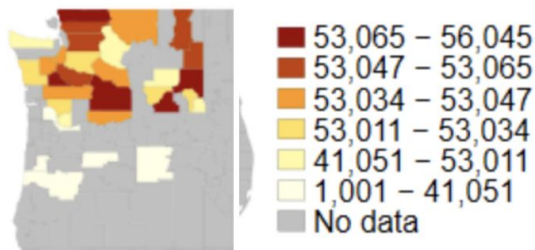
The next map shows the data from 2020, the levels in this map are much higher than that of the data from 2018. It is also important to note that there was not a complete set of data from all counties for Oregon in 2020. Our maps confirm the regression we ran, the policy that Oregon put in place to lower toxic air contaminants did not improve

2020:

Oregons air quality. Because we were only able to look at the data as it changed from 2018 to 2020, we cannot be certain that the policy would not imporve air quality over a longer period of time, but for the period of time we studied the AQI in Oregon did not improve by a statistically significant amount.

Although there was a change in AQI (in both states) over the studied years, we cannot determine that it was a result from the enacted policy OR S 1541. Its likely that a multiude of other un-studtied factors attributed to the change in air quality, such as population growth, industrialization of rural areas, change in climate/weather, or other man made pollutants.

///// Will's code!
*egen oregonmean2016 = mean(medianaqi) if state == "Oregon" & year == 2016
*egen washmean2016 = mean(medianaqi) if state == "Washinton" & year == 2016
*egen oregonmean2020 = mean(medianaqi) if state == "Oregon" & (year == 2020 | year == 2018)
*egen washmean2020 = mean(medianaqi) if state == "Washinton" & (year == 2020 | year == 2018)
gen post = inlist(year, 2018, 2020)
gen treat = inlist(state, "Oregon")
gen treatXpost = treat * post

reg medianaqi post treat treatXpost
////

```
 1   //Maptile functions
 2   ssc install maptile, replace
 3   ssc install spmap, replace
 4   maptile_geohelp county2014
 5
 6   //maptile_install using
     "http://files.michaelstepner.com/geo_county2014.zip"
 7
 8
 9
10   //Append Oregon 2016 and 2018
11   import delimited
     "C:\Users\margi\Desktop\LastGroupProject\annual_aqi_by_county_2016.c
     sv", encoding(ISO-8859-9)
12
13   keep if state == "Oregon" |  state == "Washington"
14
15   save temp16N
16
17   import delimited
     "C:\Users\margi\Desktop\LastGroupProject\annual_aqi_by_county_2018.c
     sv", encoding(ISO-8859-9) clear
18
19   keep if state == "Oregon" |  state == "Washington"
20
21   append using temp16N
22
23
24
25   //Append previous combination and Oregon 2020
26   preserve
27
28       clear
29
30       import delimited
     "C:\Users\margi\Desktop\LastGroupProject\annual_aqi_by_county_2020.c
     sv", encoding(ISO-8859-9)
31
32       save temp20N
33
34   restore
35
36   append using temp20N
37
38   keep if state == "Oregon" | state == "Washington"
39
40   sort county year
41   *can also do "sort year county" if the year is more important
```