Research Methods Homework 2

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1 Testing Pre-Trend

1.1 Regression results

Table 1: **Regression Test on Pre-Trends**

VARIABLES	(1) **Lung Hospitalizations**
treated	-2,435.723*** (214.205)
Observations	550
Number of stateid	50

*** p<0.01, ** p<0.05, * p<0.1

Notes: This table contains regressions results testing whether the treated (with vaping ban) group are significantly different from the control (without vaping ban) group prior to the vaping ban in 2021. Standard OLS errors are reported.

From Table 1 above, we see that the coefficient on treated is negative and statistically significant with p = .000. We reject the null hypothesis that there is no pre-trend, suggesting evidence for between-group difference in lung-related hospitalization before the vaping ban.

1.2 "Parallel"-Trend Graph

From Figure 1 below, we see that when we compare the treatment group and control group before 2021, there appears to be a significant between-group difference in 2020, where the treated group that received vaping ban in 2021 experienced a significantly larger drop in lung hospitalizations comparing to the control group.

Figure 1: **Diagnostic DiD Graph (dash: 2021)**

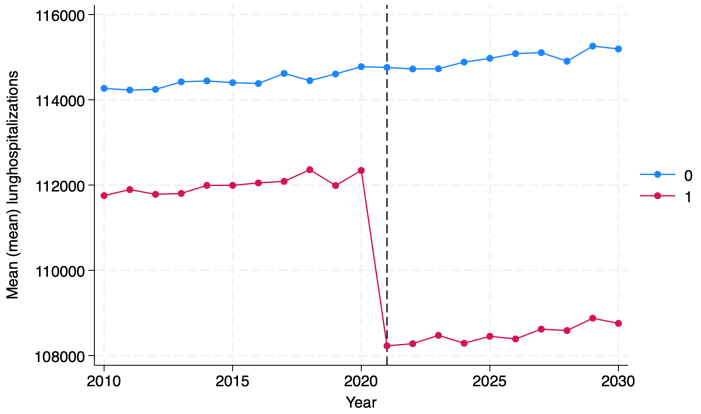
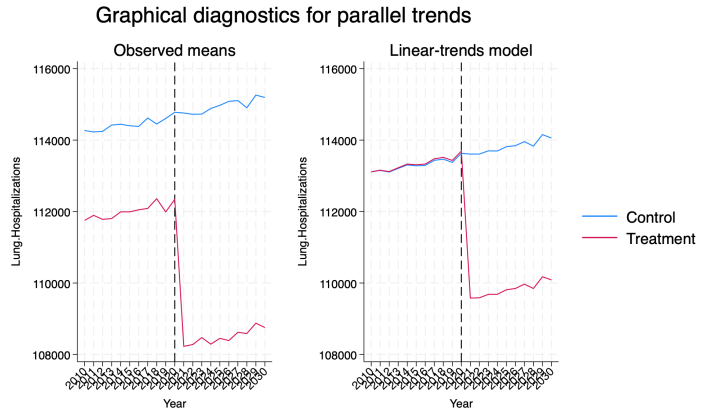


Figure 2: **Diagnostic DiD Graph (dash: 2020)**



When we use the *estat trendplots* command in STATA, we get Figure 2 which sets the comparison cutoff time at year 2020. In this case, with both observed means and linear-trends models, there appear to be no between-group differences prior to 2020.

Considering the regression results (which sets cutoff at 2021), we cannot conclude that there is no significant difference between treated and control group prior to treatment. It is very plausible that there is a significant gap in announcement vs implementation gap of the vaping law that local cities or counties in the "treated" states implemented the ban before 2021. We thus need to interpret the ATT from the DiD regression with caution.

2 DiD Regression with Fixed Effects

Table 2: **ATT Effects of Vaping Ban on Lung Hospitalization**

VARIABLES	(1) lunghospitalizations
1.treated	-4,917.542***
	(165.698)
1.post	974.593***
	(109.676)
1.treated#1.post	-4,030.462***
	(65.382)
Observations	1,050
R-squared	0.963

*** p<0.01, ** p<0.05, * p<0.1

Notes: This table contains DiD regressions results on the average treated effect on the treated (with vaping ban) group. Standard OLS errors are reported. State-level and year fixed effects are included in the specification.

From Table 2 above, we see that from the DiD regression, the coefficient on treated*post is negative (-4,030.462) and statistically significant with p = .000. With state-level and year-level fixed effects, and assuming there is no pre-trend (inconclusive), we reject (with caution) the null hypothesis and provide some evidence for the reduction in lung hospitalizations following vaping ban, in the implemented states after 2021.

3 Additional Questions

3.1 How many state-level fixed effects are there?

We need to exclude the baseline state (State 50), so the number of state FE = 50 - 1 = 49.

3.2 What is the interpretation of the coefficient for each state-level fixed effect?

We can interpret each state's FE coefficient as the difference in average lung hospitalizations relative to the baseline State 50, all else equal (treated vs not treated with the vaping ban, year).

3.3 Can you reject the hypothesis that state fixed effects are all zero?

We perform F-test from testparm using the code *testparm i.stateid* to test the H_o that all state FE $= 0$. We obtain a test statistic of $F(48, 979) = 44.05, p = 0.000$. We thus reject the H_o that state fixed effects are all zeros.