* **Research Methods-2 Assignment – Homework 2**

The graph below represents the traditional Differences-in-Differences analysis. The Treated group comprises of the 23 states that received the treatment of Vaping Ban in the post-2020 period, whereas not treated group comprises of the 27 states that do not have such a law throughout the panel.

**Pre-trends:** It is evident that throughout the 2010-20 period (which serves as the pre-treatment time), the time trends between the two groups are extremely similar. There is only a very slight positive slope that remains across the two groups. The model to test the similarity of the two slopes (treatment and control group) is also listed in Table 1 (Model 1). Here, we use Lung Hospitalizations as the DV in the pre-treatment period, and the IV is the year itself (to get a trend across years). The interaction term (that is not significant) tests whether there is a difference in slopes of the two groups (treated vs control) for the time variable)

The year 2021 is the first year with the Vaping Ban, and we can see a stark decrease in the number of lung hospitalizations immediately following this ban in the treated group. This is evidence for the causal effect of the vaping ban on reduced lung hospitalizations. In model 2 (Table 2), we test for the effect of Vaping Ban on lung hospitalizations, controlling for both individual state effects and time effects through fixed effects. The coefficient is significant and negative.

**Figure 1:** Differences-in-Differences Graph for our data

Chart

Description automatically generated

**Table 1:** Regression Results

|  |  |  |
| --- | --- | --- |
|  | Model 1 (pre-2021 only) | Model 2 |
|  | **DV:** Lung Hospitalizations | |
| Year | 46\*\*\* |  |
|  | (16) |  |
| Treated Group | -14,856 |  |
|  | (48,672) |  |
| Treatment Group x Year | 6.2 |  |
|  | (24) |  |
| Vaping Ban passed |  | -4,030\*\*\* |
|  |  | (65) |
| Constant | 22,671 | 110,787\*\*\* |
|  | (33,011) | (137) |
| Fixed Effects: State | No | Yes |
| Fixed Effects: Year | No | Yes |

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

**Additional Questions**

* How many state-level fixed effects are there?

The model has a total of 49 variables (for each state from 2 till 50) to capture individual state-level fixed effects. The effect of the first state is the benchmark effect (i.e., absorbed in the constant term).

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

Other things remaining constant, on average, the fixed effect for a particular state represents the additional (or lower) number of lung hospitalizations that are likely to occur in that state in a particular year, compared to the benchmark number of hospitalizations in state 1. For example, a coefficient of 971 (for state 9) implies that for any particular year, state 9 is likely to have 971 more hospitalizations than state 1, with the other variables (year and treatment state) being held constant.

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

No, we cannot reject this hypothesis. Running a combined hypothesis test for all 49 of our fixed effects to be 0 (i.e., there are no fixed effects), we find:

F(49, 979) = 102.63

Prob > F = 0.0000

Thus, we reject the null hypothesis that there are no state-specific fixed effects.