

## **Exercise 12 - Solution - BSTS Causal Impact**

- 1. What was the actual revenue for the treated region in the post period? Do you recall what the ground truth decomposition between the monthly baseline revenue (if not for the treatment) and the average treatment effect?**

The actual revenue during the post period for treated Region 5 was an average of \$12,913 which matches the ground truth. The true baseline monthly revenue (if not for the treatment) for Region 5 was \$10,760 with an average treatment effect of \$2152 (20%).

- 2. How did the Synthetic Control (BSTS) decompose the actual value into the baseline and incremental treatment effect? What is the percentage increase?**

The synthetic control using Causal Impact and BSTS correctly identified the realized revenue; however, it decomposed this into a monthly baseline at \$11,152 and a treatment effect of \$1761 (16% increase).

- 3. How does the Synthetic Control (BSTS) estimate compare to the ground truth? How did it do compared to the other models we reviewed?**

While this correctly identifies a statistically significant and positive effect, in this example, Causal Impact using BSTS (without tuning) underestimates the treatment effect. Notably, this model performed worse (was less accurate relative to the ground truth) than the synthetic control (Lasso weights) and the event study, though it outperformed the Difference-in-Differences model.