

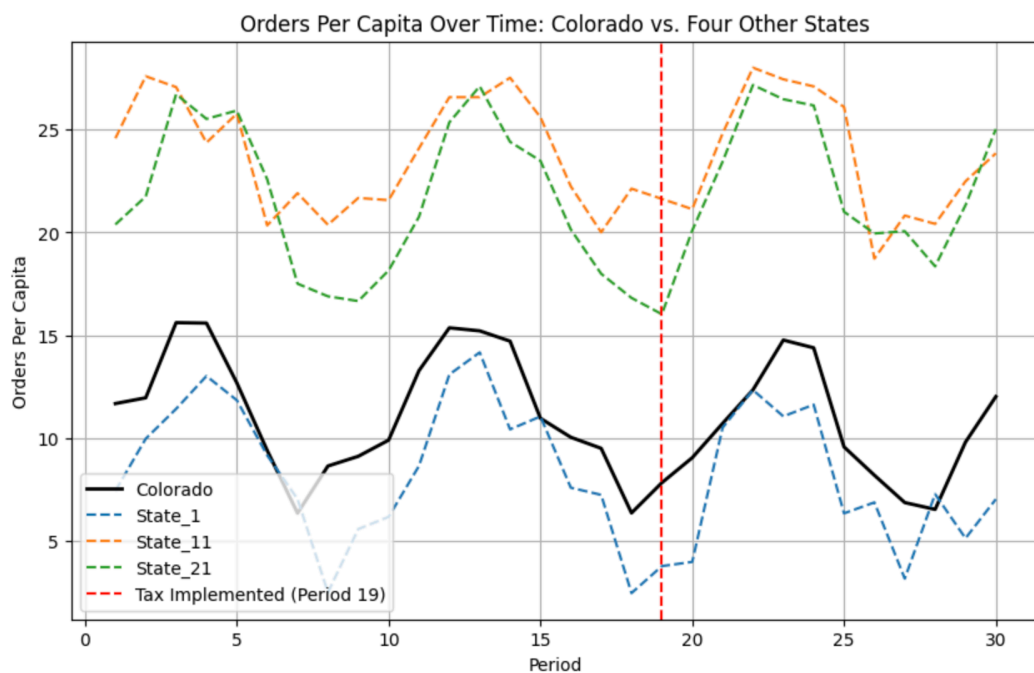
The Effect of the Colorado Delivery Tax—Synthetic Control

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Customer Analytics

Preliminary Exploration

Colorado vs. Donor States

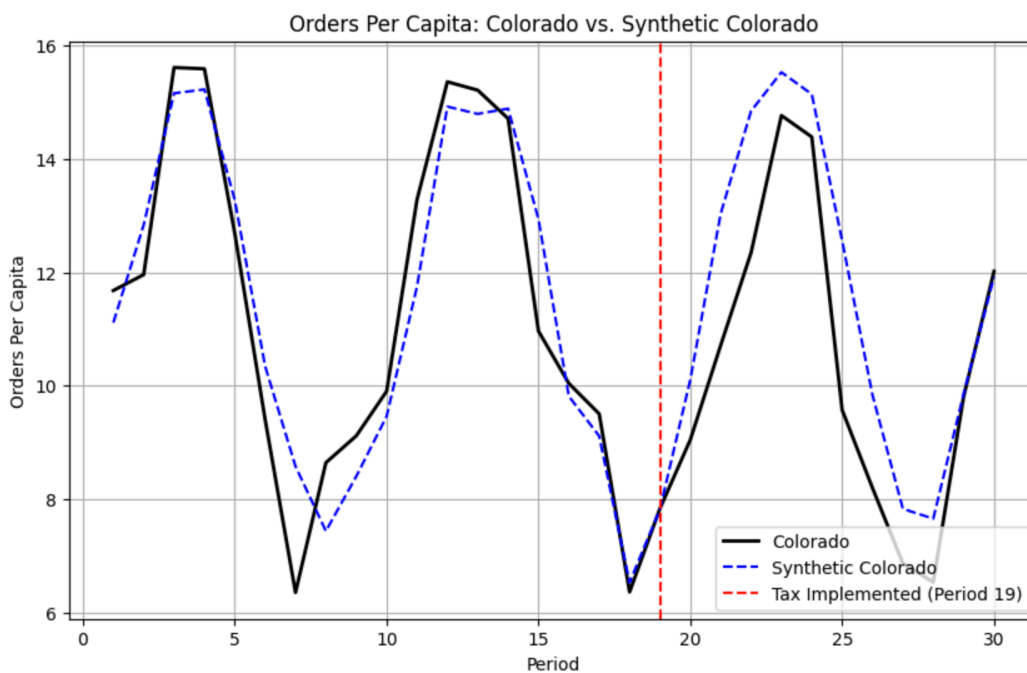


Preliminary Exploration

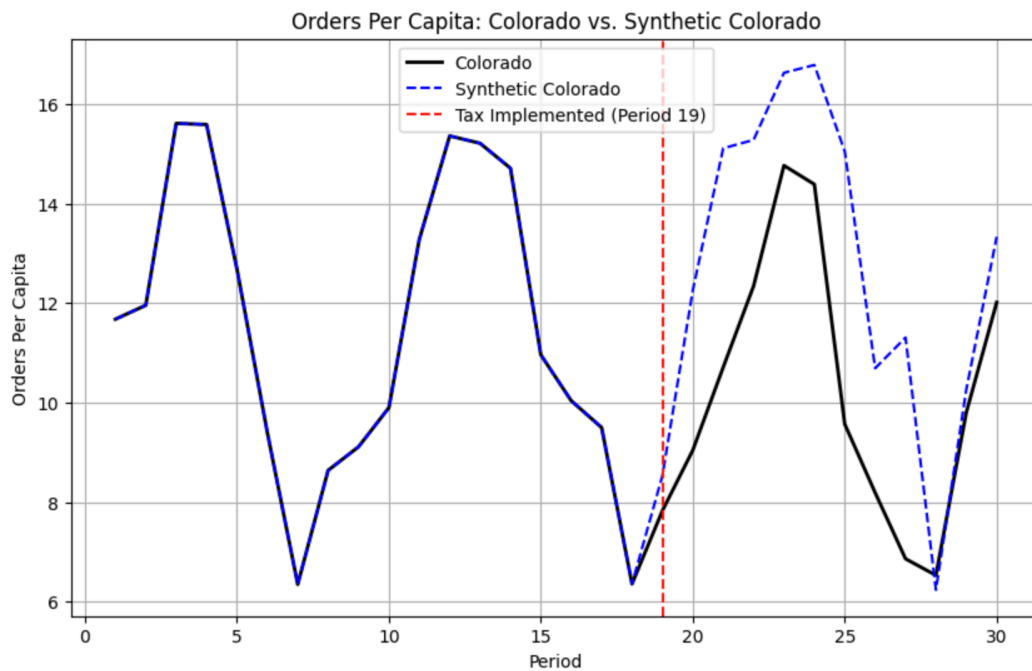
Regression $\text{OrdersPerCapita} \sim \text{period} * \text{Colorado}$

- What does the interaction term between period and Colorado mean?
- How many of the 29 regressions have significant interaction coefficients?
- The insignificance of the interaction is only a “necessary condition” for a valid control
 - Lack statistical power
 - Misspecification of the time trend in the regression

Synthetic Control (with the “Convex Hull” Constraint)



Synthetic Control (without the “Convex Hull” Constraint)



Effect Size

ATT after Period 19:

```
# Calculate treatment effect (difference between actual and synthetic)
diff_orders = wide_data['Colorado'] - synthetic_colorado_new

# Calculate average treatment effect after implementation (post-1989)
colorado_att_post = diff_orders[wide_data.index >= 19].mean()
print("\nATT after Period 19:", round(colorado_att_post, 2), "Orders per Capita")

# Calculate percentage change
baseline = synthetic_colorado_new[wide_data.index >= 19].mean()
percent_change = (colorado_att_post / baseline) * 100
print(f"Percent Change: {round(percent_change, 1)}%")
```

ATT after Period 19: -1.17 Orders per Capita
Percent Change: -10.3%

Inference (Significant?)

Using Placebo Test (Fisher's Exact Test): **3.45%**

