Do Drinkers Bet More?

An analysis of the correlation between alcohol consumption and sports betting volume

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BACKGROUND & HYPOTHESES

In the past few years, the popularity of sports betting has risen as it is gradually being legalized across the States. With the ongoing challenges related to alcohol abuse in the US, we thought exploring the correlation between alcohol consumption and the prevalence of sports betting was an opportunity to explore societal issues related to public health and economic stability.

H_0 There is **no** correlation between alcohol consumption and sports betting.

H_1 There is a **strong positive** correlation between alcohol consumption and sports betting.

DATA & METHODS

population from US Census

year	state	population

alcohol from National Institute on Alcohol Abuse and Alcoholism

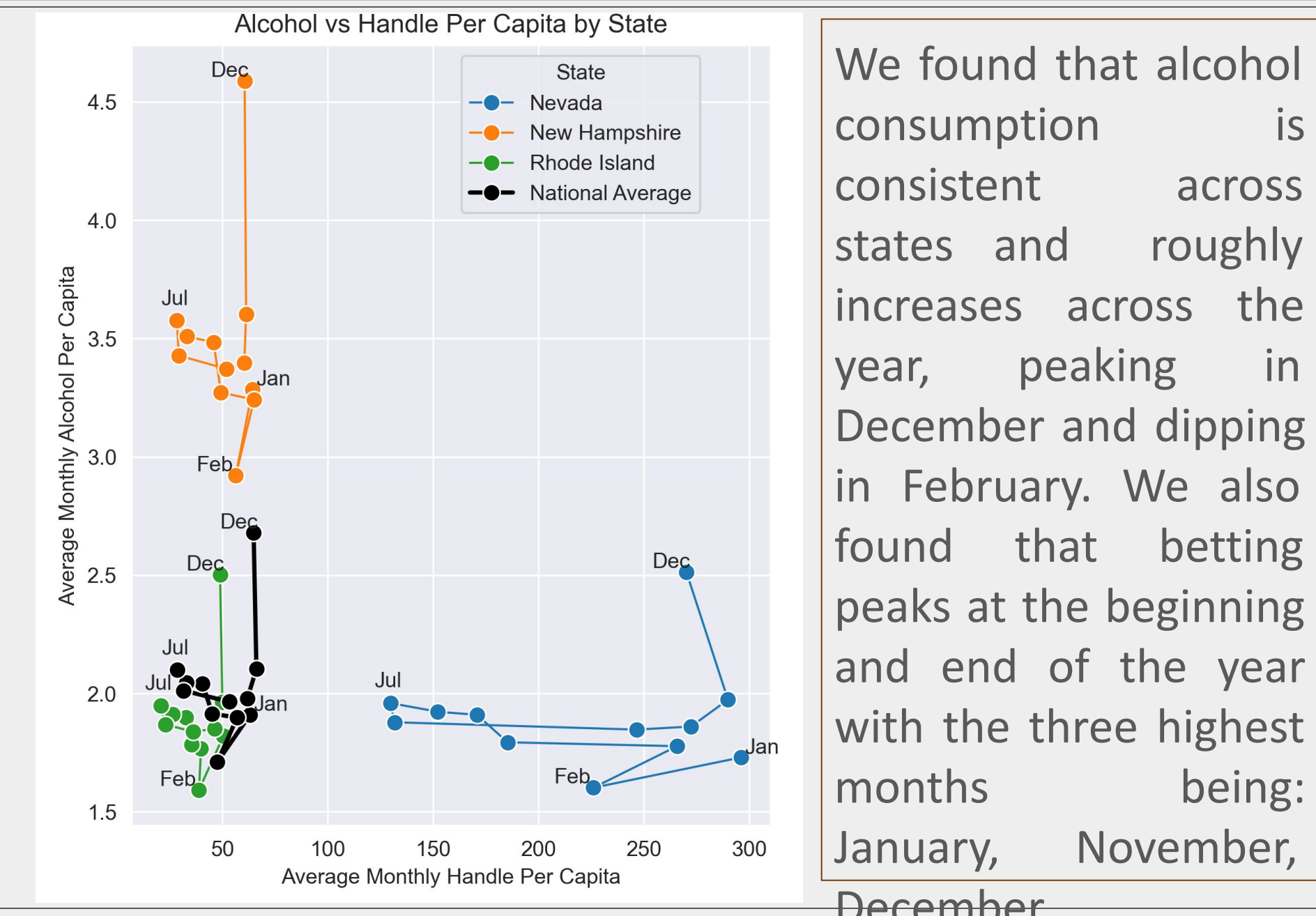| year	state	beverage_type	gallons

sales from Federal Reserve Economic Data (FRED)

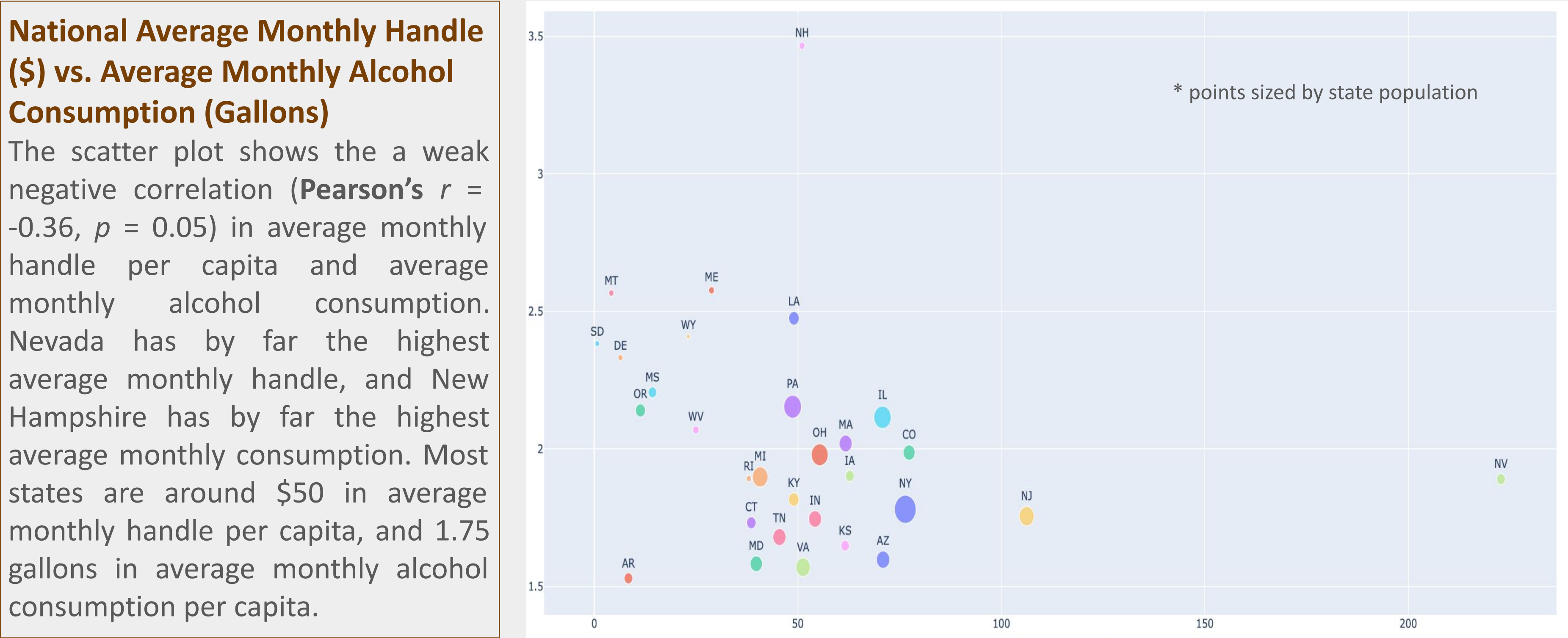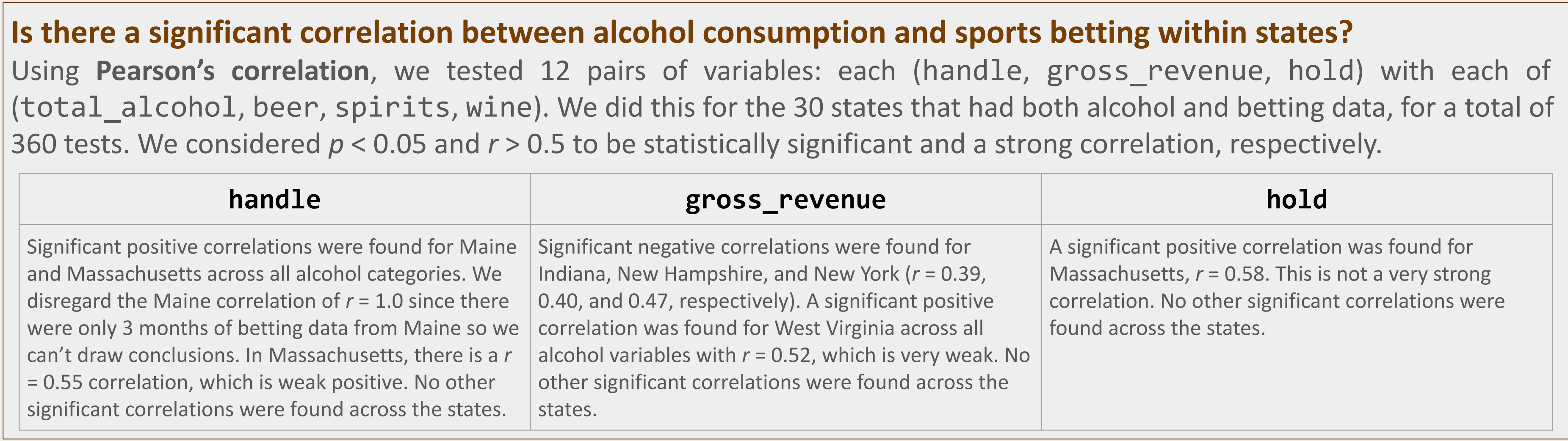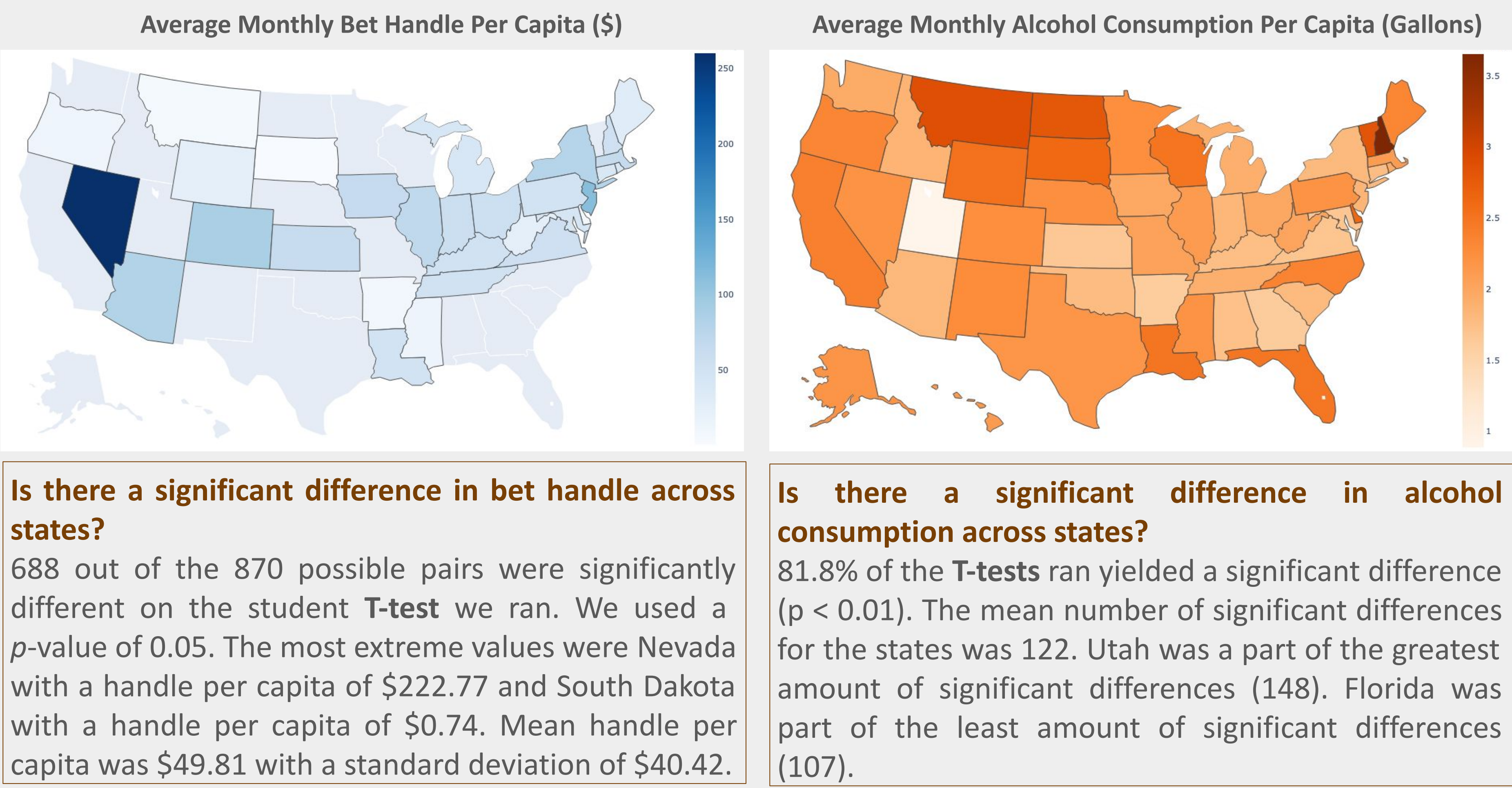| year	month	amount_sold

bets from Covers.com

year	month	state	handle	gross_revenue	hold

- Interpolated **population** to (month, state) and used **Random Forest Regression** to predict 2024
- Interpolated **alcohol** to (state, consumption) using **Elastic Net Regression** to predict for 2022-2024

TRENDS

Alcohol vs Handle Per Capita by State

We found that alcohol consumption is consistent across states and roughly increases across the year, peaking in December and dipping in February. We also found that betting peaks at the beginning and end of the year with the three highest months being: January, November, December.

RESULTS

Average Monthly Bet Handle Per Capita ($)

Average Monthly Alcohol Consumption Per Capita (Gallons)

Is there a significant difference in bet handle across states?
688 out of the 870 possible pairs were significantly different on the student **T-test** we ran. We used a *p*-value of 0.05. The most extreme values were Nevada with a handle per capita of $222.77 and South Dakota with a handle per capita of $0.74. Mean handle per capita was $49.81 with a standard deviation of $40.42.

Is there a significant difference in alcohol consumption across states?
81.8% of the **T-tests** ran yielded a significant difference (p < 0.01). The mean number of significant differences for the states was 122. Utah was a part of the greatest amount of significant differences (148). Florida was part of the least amount of significant differences (107).

Is there a significant correlation between alcohol consumption and sports betting within states?
Using **Pearson's correlation**, we tested 12 pairs of variables: each (handle, gross_revenue, hold) with each of (total_alcohol, beer, spirits, wine). We did this for the 30 states that had both alcohol and betting data, for a total of 360 tests. We considered *p* < 0.05 and *r* > 0.5 to be statistically significant and a strong correlation, respectively.

handle	gross_revenue	hold
Significant positive correlations were found for Maine and Massachusetts across all alcohol categories. We disregard the Maine correlation of *r* = 1.0 since there were only 3 months of betting data from Maine so we can't draw conclusions. In Massachusetts, there is a *r* = 0.55 correlation, which is weak positive. No other significant correlations were found across the states.	Significant negative correlations were found for Indiana, New Hampshire, and New York (*r* = 0.39, 0.40, and 0.47, respectively). A significant positive correlation was found for West Virginia across all alcohol variables with *r* = 0.52, which is very weak. No other significant correlations were found across the states.	A significant positive correlation was found for Massachusetts, *r* = 0.58. This is not a very strong correlation. No other significant correlations were found across the states.

National Average Monthly Handle ($) vs. Average Monthly Alcohol Consumption (Gallons)
The scatter plot shows the a weak negative correlation (**Pearson's** *r* = -0.36, *p* = 0.05) in average monthly handle per capita and average monthly alcohol consumption. Nevada has by far the highest average monthly handle, and New Hampshire has by far the highest average monthly consumption. Most states are around $50 in average monthly handle per capita, and 1.75 gallons in average monthly alcohol consumption per capita.

* points sized by state population

CONCLUSION

We **fail to reject the null hypothesis** that there is no correlation between alcohol consumption and sports betting. In 360 correlation tests, 26 were significant, but only 12 were *weakly* positive. These were the states of Massachusetts and West Virginia. Nationally, we found a significant weak negative correlation between alcohol and betting. We conclude that **there is not a significant strong positive correlation between sports betting and alcohol** state-wise or nationally in the United States.

CHALLENGES

The biggest challenge was the limited data, specifically for sports betting. Data was only available starting in 2022 with many states only having data starting in 2023. In addition, the limited granularity of the alcohol consumption data required interpolation to convert to monthly format. Finally, managing the several sources of data proved somewhat difficult.

CAPSTONE

Interactive website with visualizations using our data!

- Bar chart race for wine, beer, spirits, bets, and population
- Heatmap with states clustered by a stratified variable, dropdown to select

ACKNOWLEDGEMENTS