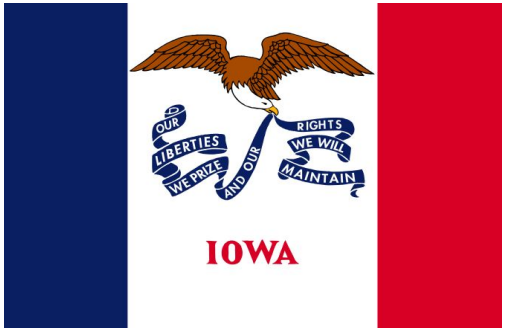
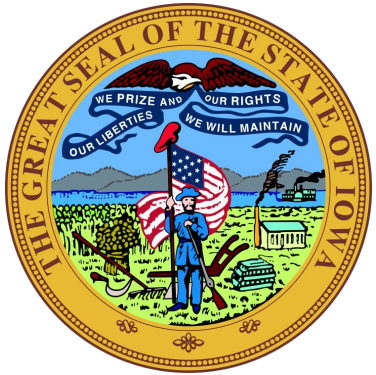


Analysis and Model for Iowa State Liquor Sales 2015-2016



Summary

- What does the 2015 data tell us? (Which factors affect sales?)

Prediction

- Methods of Analysis
- Findings
- Limitations

Recommendations

- Next steps
- Further questions

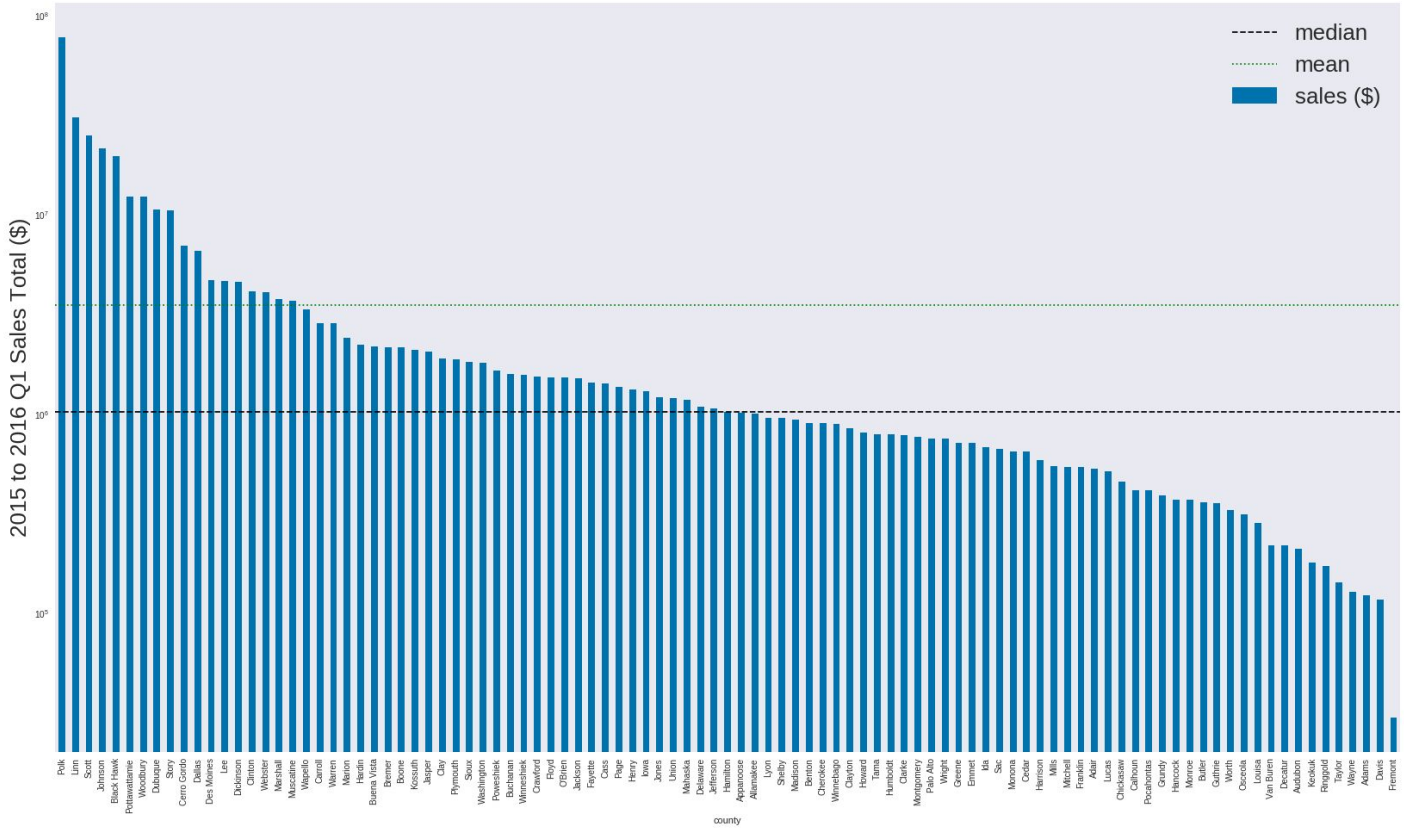
Description of Dataset

Transactions from the State the store retails from January 2015 to March 2016:

- Store Number (1403)
- City (386)
- Zip Code (415)
- County Number (99)
- County (99)
- Category (89)
- Category Name (73)
- Vendor Number (159)
- Item Number (3865)
- Item Description (3029)

- Bottle Volume, State Bottle Cost, State Bottle Retail
- Bottles Sold, Sale (Dollars), Volume Sold (Liters), Volume Sold (Gallons)

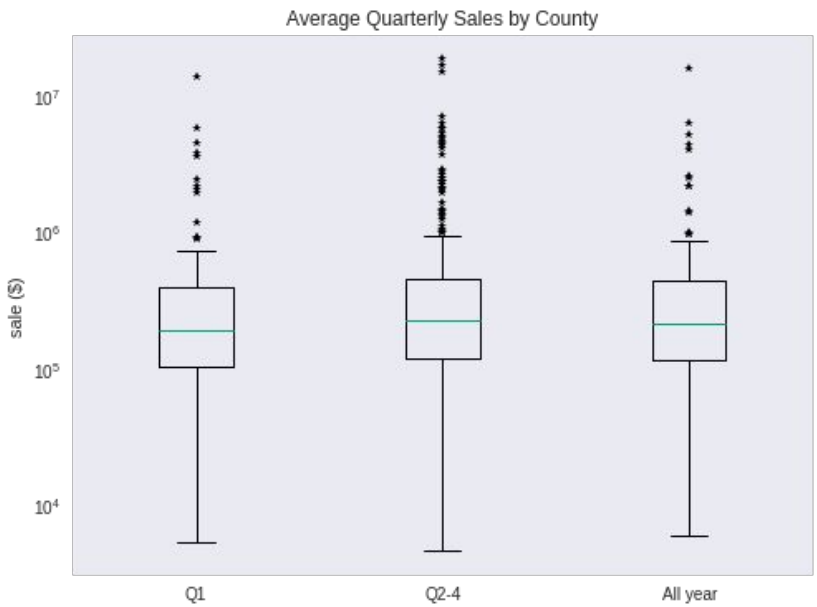
Total Sales by County



The most populous counties, e.g. Polk, Linn, and Scott, etc., are outliers (10-100x the median)

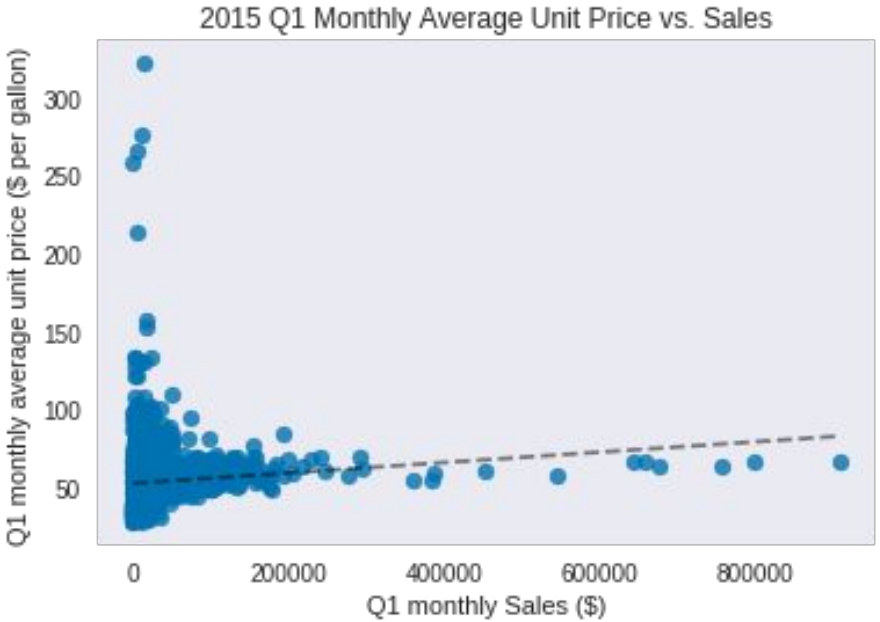
Model must account for the variations by county

Quarterly Sales by County



- Quarterly sales appear more or less consistent throughout the year
- Consistent outlier counties, which must be accounted for in the model

Liquor Unit Price vs. Sales



The correlation is statistically significant

Pearson correlation coefficient: 0.102

The unit price may be an indicator for the quality of the liquor

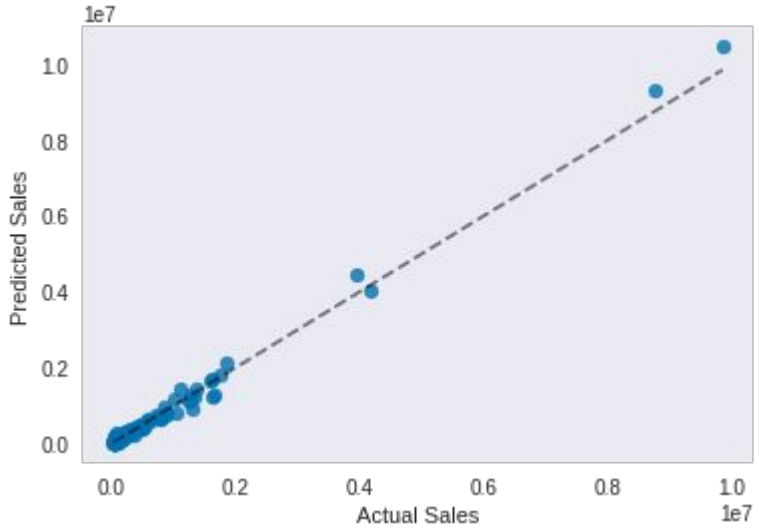
Methods of Analysis

- Sum transactions by store and by month
- Predictors used:
  - County (dummy variables)
  - Monthly sales
  - Monthly bottles sold
  - Monthly average unit price ($ per gallon)

} from each month of the first quarter

- Model with Lasso regularized linear regression (compared with Ridge, no regularization)
- Evaluate model performance
  - Cross-validation
  - Train/test split

Model Performance



Root-Mean-Square Error (RMSE) : 85,949

Predictors actually used by the model (coefficients not equal to zero):
- January/February/March sales
- Dallas County

Findings

- Sales in 2016 Q1 increase 4.03% compared with 2015 Q1
  ($65.5 million vs. $63.0 million)

- Annual sales of 2015:
  284 million

- Projected sales of 2016 based on Q1 data:
  280 million (1.39% decrease)

Limitations of the Model

- Missing county information
  - 0.40% of the transactions (0.35% of total sales)
  - may limit accuracy of model, during both model fitting and prediction

- May not work well on stores with extremely high volumes of sales

- Other predictors to consider:
  variety of liquor, mark-up rate

Recommendations

- Tax revenue from liquor sales projected to decrease if tax rates remain unchanged; however, increasing tax rate may further discourage liquor sales
- While reducing price mark-up rate will lower sales margins, it may encourage more sales
- Issue more liquor licenses to encourage liquor sales

How these and other factors would affect liquor sales and revenue needs further investigation

Thank you for your attention!