A Note on the Effects of Economic Factors on the Sale of Alcohol

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Abstract

This note examines the correlation between alcohol sales and economic factors using data we deduced to be statistically significant to our model. We will look at Gross Domestic Product, Consumer Price Index, and Average Household Income. We found that testing these economic variables against alcohol sales did in fact have a negative relationship, and Americans do in fact drink more during the economic crisis on average.

1 Introduction

When the coronavirus pandemic came to the United States the government had many decisions to make about what to do in this unprecedented time. They had to choose whether or not to close businesses and they had the incredibly difficult decision of deciding which businesses are essential. Some businesses were obviously essential like grocery stores and pharmacies but the rest were not as easy to call. Some citizens may find a business essential to their everyday life while others may not see the importance of the same service. Ultimately the government determined that liquor stores were an essential business and would remain open during the time of quarantine. Alcohol sales have been booming since the social distancing guidelines have been put in place. The third week of March 2020 saw a 55% increase in alcohol sales. This seems like the opposite of what would happen during this crisis. The rate of alcohol sales has been steadily increasing since 1992, with some spikes and drops throughout the years.

In an ideal world, alcohol would be considered to be a normal good meaning that the increases in income would increase demand. However, since alcohol can be used as a coping mechanism for stressful or sad situations it does not always happen that way. In fact, it can be shown that alcohol consumption rates and binge drinking have a positive relationship to unemployment.

The purpose of this paper will be to determine whether or not alcohol sales are directly affected by economic factors. We will use regression analysis in order to determine the relationships. The goal is to find out if during times of recession or natural disasters if people drink more or less alcohol as a result of the economic state of the nation.

2 Data, Hypotheses, and Methodology

The primary source of the data is the Federal Reserve Bank of Saint Louis. The data contains quarterly observations from the first quarter of 1992 until the last quarter of 2019 in the United States. Since we are trying to determine whether or not alcohol sales are affected by economic pressures the quarterly data for beer, wine, and distilled alcoholic beverage sales are used as the dependent variable.

The choice of independent variables that could affect the sales of alcoholic beverages in the United States was a very difficult one to make. The variables that were chosen are all grounded in economic theory. The availability and reliability of data for each variable was also a consideration for what independent variables to include. The first variable that we included was the real gross domestic product. Based on economic theories we hypothesized that GDP would be positive. This is because when GDP is higher it often means that the economy is doing better and people have more money to spend on goods that are not necessarily essential. A variable for the unemployment rate was also important to include in the model. This is because, for similar reasons as GDP. We hypothesized that the higher the unemployment rate is the rate of alcohol consumption would be lower since people would have less money to spend in theory. We also include data for the consumer price index and average annual household income. We hypothesized that the more each household made per year the more alcohol they would purchase and that the consumer price index variable would also have a positive sign. With all these considerations the base model for alcohol sales is:

$$sales_t = \beta_1 x_{,t} + \beta_2 y_t - \beta_3 z_t + \beta_4 k_t + \varepsilon_t \quad (1)$$

Where x_t is the real gross domestic product for the period *t*. The variable y_t represents the consumer price index during the time period *t*. z_t is the unemployment rate for the period *t*. The average household income for a period *t* is represented by the variable k_t. Lastly, the variable ε is the error term.

3 Estimation and Results

After running a regression in R studio with the model from equation (1) and the data that we had collected from online resources we came up with the following model:

$$y = -704.76 - 0.25x + 28.47y - 46.57z + 1.233k$$

$$R^2 = 0.9968$$

When the regression model was run it was easy to see that every variable included in the model is significant. The output of the regression shows that while unemployment is statistically significant the other variables are much more significant.

Figure 1

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Residuals:
    Min      1Q  Median      3Q     Max
-387.59 -109.72   -7.98  104.24  480.50

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept) -704.76434  468.85792  -1.503 0.135746
gdp           -0.24846    0.05405  -4.597 1.18e-05 ***
cpi           28.47058    7.25817   3.923 0.000155 ***
unrate       -46.57313   22.65616  -2.056 0.042251 *
household      1.23322    0.08290  14.875  < 2e-16 ***
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Signif. codes:
0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 164.8 on 107 degrees of freedom
  (1 observation deleted due to missingness)
Multiple R-squared:  0.9968,    Adjusted R-squared:  0.9967
F-statistic:  8414 on 4 and 107 DF,  p-value: < 2.2e-16

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The estimates show the relationship between the independent and dependent variables. They show the effect that a one-unit change in the variable does on alcohol sales. There are some aspects of distress that are no explained in this model, like natural disasters. We can assume that our model does encompass enough of the data to make prove our hypothesis. Furthermore, we could look at the breakdown between states and other geographic and demographic breakdowns to further extrapolate or model to see how it works in different places and with different people.

4 Conclusion

In this paper the relationship between the state of the economy and the amount of alcohol that is sold in the United States from 1992 until the last quarter of 2019. First, the relationship between the sale of alcohol and real gross domestic product in the United States. There was a statistically significant negative relationship between the variables. However, it was surprising that the relationship was negative and it showed that our null hypothesis is incorrect in thinking the relationship would be positive. From this, we can conclude that when the economy is distressed Americans buy and consume more alcohol. There could be many different reasons for this but one could be that people use alcohol to deal with the stress that comes from a being in a recession. The other variables that were included in the regression were also used as tests of economic pressures making people consume more alcohol. From the regression model, we can assume that American citizens drink more alcohol when in recessions or other disasters.

References

"Consumer Price Index for All Urban Consumers: All Items in U.S. City Average." *FRED*, 10 Apr. 2020, fred.stlouisfed.org/series/CPIAUCSL.

"Household Financial Obligations as a Percent of Disposable Personal Income." *FRED*, 25 Mar. 2020, fred.stlouisfed.org/series/FODSP.

"Merchant Wholesalers, Except Manufacturers' Sales Branches and Offices Sales: Nondurable Goods: Beer, Wine, and Distilled Alcoholic Beverages Sales." *FRED*, 9 Apr. 2020, fred.stlouisfed.org/series/S4248SM144SCEN.

"Real Gross Domestic Product." *FRED*, 29 Apr. 2020, fred.stlouisfed.org/series/GDPC1.

Valinsky, Jordan. "Booze Sales Are Booming as People Stockpile Alcohol ... but It May Not Last." *CNN*, Cable News Network, 1 Apr. 2020, www.cnn.com/2020/04/01/business/alcohol-sales-coronavirus-trnd/.