

Deliverable 2

Objective:

The goal of this deliverable is to gain intuition about the impact legalization of recreational marijuana has had on the state of Colorado. Our aim was to consider positive, negative and neutral socio-economic impacts of legalization of marijuana nationally with the aim to understand the overall positive and negative trend within the state of Colorado.

We explored the following variables that were potentially impacted by legalization:

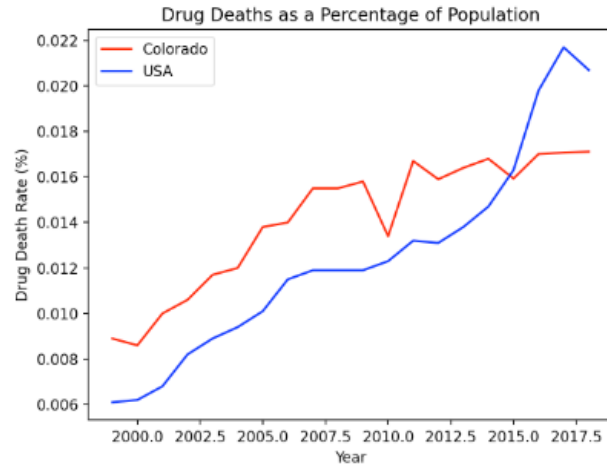
- Drug-related deaths
- GDP per capita
- Tax Revenue per capita
- Unemployment Rates
- Cigarette Sales
- Consumption of Alcoholic Beverages
- Admission to Rehabilitation Services
- Suicide Rates
- Alcohol-related Driving Fatalities

Our aim was to observe comparative trends over several years (1999-2018). Each figure features data unique to Colorado (indicated in red), and national data for each corresponding year (indicated in blue). We were able to understand how these changing trends in Colorado compared to the national trends following the legalization of recreational marijuana, in the state of Colorado, in 2012.

Key questions:

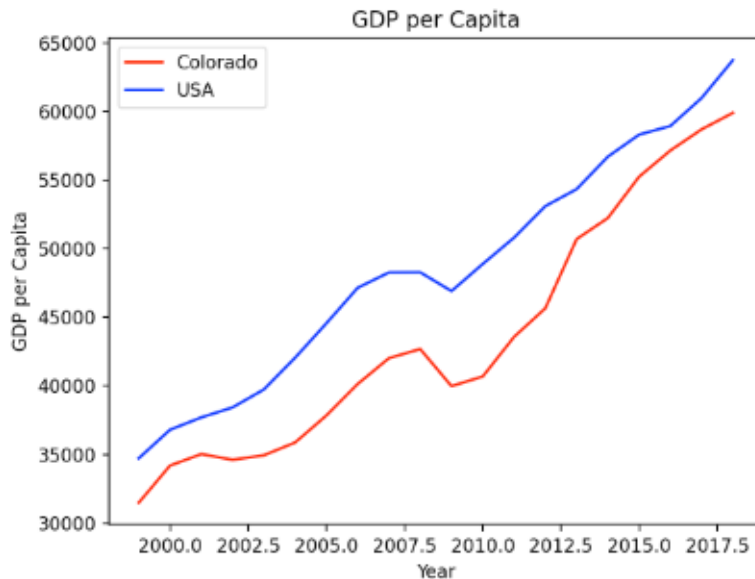
- Are there other factors that were influenced by the legalization of Marijuana in Colorado?
- How do these factors perform in Colorado as compared to their behaviour nationally?
- Can a model trained on the Colorado dataset successfully predict the effects of legalization in another state.

Drug Deaths:



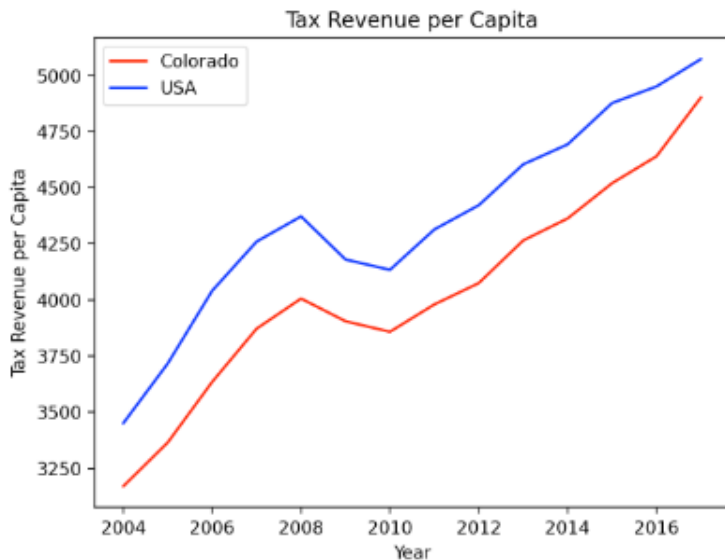
After 2012, it appears that the rate of drug deaths in Colorado significantly slows compared to the national rate. This suggests that legalization of marijuana may have a positive impact on drug-related deaths.

GDP per Capita



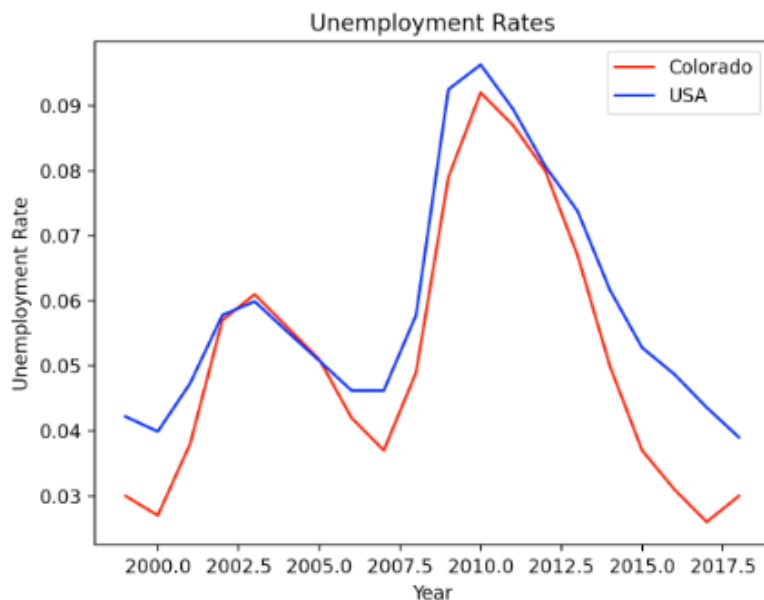
The relative fluctuation of GDP per capita between Colorado and the national average seems to be generally stable, but starting around 2012-2013, the gap seems to be starting to close. It appears that the rate of GDP per capita growth in Colorado is higher than that nationally.

Tax Revenue per Capita



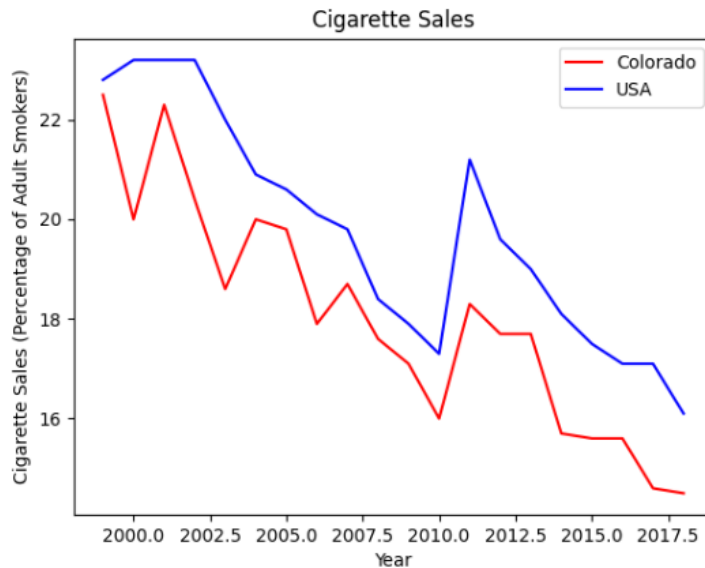
The relative fluctuation of tax revenue per capita between Colorado and the US does not seem to change much. At first glance, legalization does not appear to increase Colorado's tax revenue with respect to the nation.

Unemployment Rates



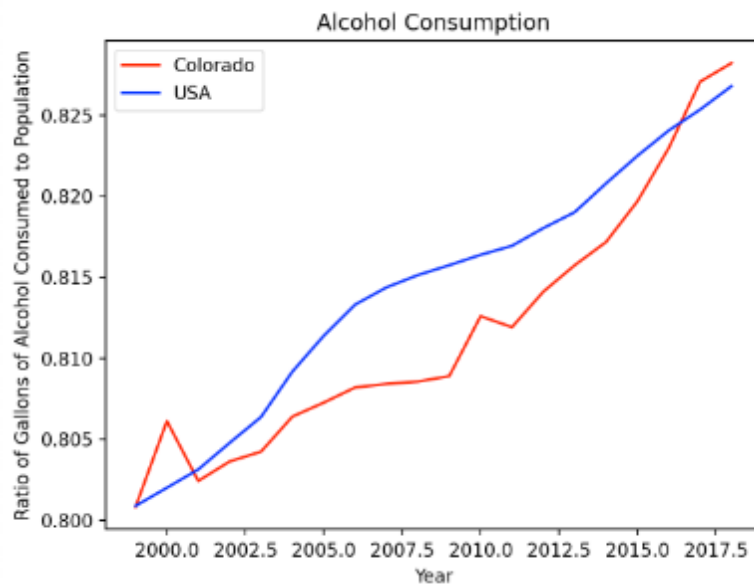
The difference in unemployment rates for Colorado and the US are relatively consistent for the most part, but around 2013, the gap begins to widen, and Colorado's UE rate is much lower than the national average. It appears that legalization may have a positive impact on employment.

Cigarette Sales



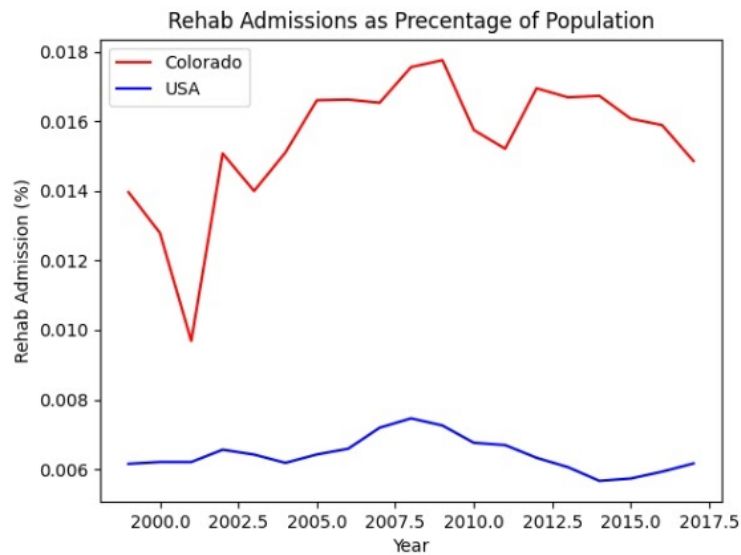
The difference in the percentage of adult smokers between Colorado and the national average remains relatively consistent, but the gap seems to widen around 2014. There is a less obvious impact here, but it is possible that legalization may reduce the number of adult cigarette smokers.

Consumption of Alcoholic Beverages



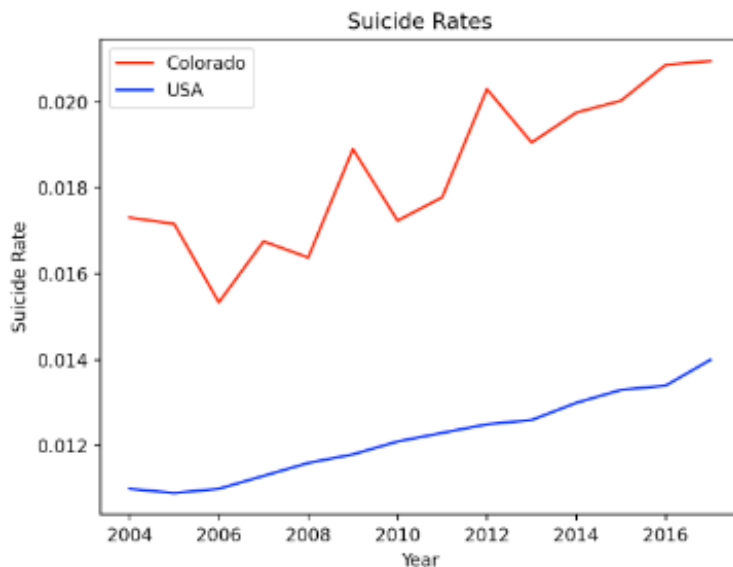
It appears that following legalization in 2012, there was an increase in alcohol consumption in Colorado, and the rate of alcohol consumption increase is higher than the national rate of increase. It appears that legalization may increase alcohol consumption- which may be related to the concept of gateway drugs.

Admission to Rehabilitation Services



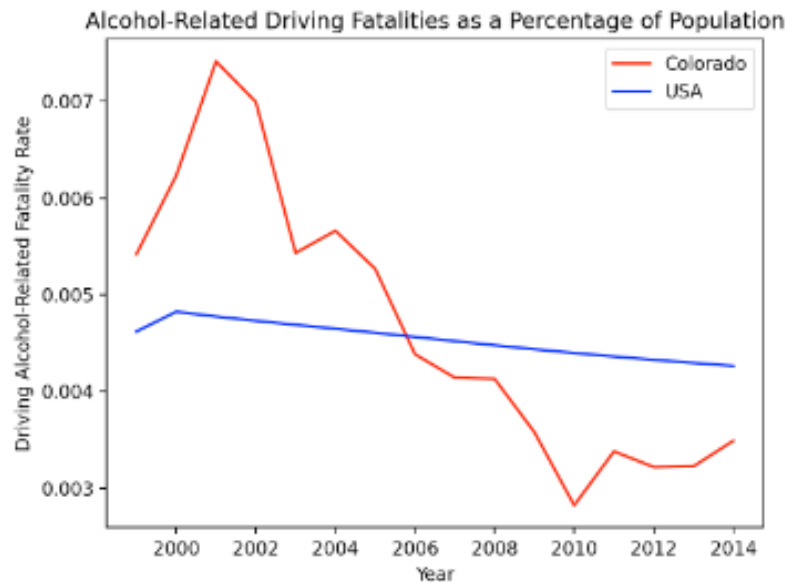
From 1999-2008, it appears that the rate of rehab admissions is increasing, but after 2014, this rate seems to be decreasing after 2014 Colorado and increasing nationally. Visually, it is vague, but there is potentially a relationship between legalization and decreasing rehab admissions.

Suicide Rates



The national suicide rate seems to be steadily increasing. The Colorado suicide rate generally is increasing as well, but there does appear to be an initial drop right after 2012. The relationship between legalization and suicide rates is unclear from the graph alone.

Alcohol-related Driving Fatalities



The trend of alcohol-related driving fatalities is mostly negative, but around 2010, the rate seems to begin to increase once more. Visually, this relationship is also vague, and more years of data is likely necessary to make further assumptions.

Refined project scope, Observations and Next Steps:

Through simple initial visual analysis, we gained the following intuitions:

Factors that may have been significantly impacted by legalization:

- Drug-Related Deaths
- GDP per capita
- Unemployment Rates
- Consumption of Alcoholic Beverages
- Admission to Rehabilitation Services

The other factors will likely require a more quantitative analysis for further examination.

Therefore, our next steps are to fit a linear regression model to the data, and obtain metrics such as the slope and the correlation coefficient so as to verify or reject our intuitions above.

We would also like to address whether our model trained on the Colorado data is able to successfully predict the increase in drug deaths after legalization in other states. To do so, we would potentially define a correlation or similarity function.

Limitations and Risks:

- We were unable to find substantial data for certain variables that we would have liked to consider such as black market marijuana sales and drug tests administered by private companies.
- Another potential risk is the inability to conclude whether our prediction model accurately works on other states given the states' socio-economic factors.
- Data discrepancy issues may potentially skew the results.