Financial Modeling

Fatal Car Accidents & Debt Ratio Analysis

Conclusion & Inference

Impact of Beer Tax on Fatal Car Accidents

Key Findings:

1. **Initial Simple Regression (Part c)**
    - The regression of **fatalities on beer tax** alone showed no significant relationship. This suggests that beer taxes, in isolation, are **not a strong predictor** of vehicle fatalities.
    - The positive coefficient on **beertax** was unexpected, but the statistical insignificance indicated that this variable alone does not explain changes in fatalities.
2. **Multivariate Regression (Part d)**
    - When controlling for factors like **income, miles driven, unemployment, population, alcohol-related fatalities, and the percentage of Mormons**, the coefficient on **beer tax became statistically significant and positive**.
    - This contradicts the expectation that **higher beer taxes reduce fatalities**, suggesting that **other confounding factors might be influencing the results**.
    - **Alcohol-related fatalities and miles driven had a strong positive impact on vehicle fatalities**, reinforcing the idea that alcohol consumption and exposure to driving risks are major contributors to accidents.
3. **Fixed Effects Model (Part e)**
    - After including **state and year fixed effects**, the **beer tax coefficient flipped to negative and became significant**.
    - This suggests that failing to **control for state-specific and time-specific factors** led to **misleading results** in previous models.

- **Income and alcohol-related fatalities remained strong predictors**, but variables like **miles driven and the percentage of Mormons became insignificant**.

4. **Night-time Fatalities (Part f)**
    - Beer tax did not have a significant impact on **night-time fatalities**, indicating that increasing alcohol prices might not deter risky nighttime driving behaviors.
    - **Income, miles driven, population, and alcohol-related fatalities** remained significant predictors.
    - When **state and year fixed effects** were included, most control variables became insignificant except for **alcohol-related fatalities**, emphasizing its dominant role.

Overall Conclusion & Policy Implications:

- The **initial naive regression suggested no link between beer tax and fatalities**, but after including proper controls and fixed effects, **higher beer taxes were associated with fewer fatalities**.
- The findings highlight that **policy evaluations must control for regional and time-specific factors** to avoid biased conclusions.
- **Alcohol-related fatalities consistently predicted total and nighttime accidents**, suggesting that **other policies (e.g., stricter DUI laws, increased law enforcement) might be more effective than just raising beer taxes**.
- Policymakers should consider **comprehensive measures** rather than relying solely on taxation to reduce alcohol-related fatalities.

Profitability and Capital Structure (Debt Ratio Analysis)

Key Findings:

1. **Profitability & Leverage (Part b)**
    - The **initial regression of leverage (tdm) on profitability** alone found a **positive but insignificant** coefficient.

- This suggests that **profitability alone does not significantly impact a firm's leverage decisions**, though the positive sign aligns with theories suggesting profitable firms can raise debt more easily.

2. **Adding Control Variables (Part c)**
    - When controlling for **firm size, capital expenditures, industry median leverage, and market-to-book ratio**, **profitability became statistically significant with a negative sign**.
    - This indicates that **more profitable firms tend to reduce debt**, supporting the **pecking order theory**, which suggests that firms prefer internal financing over external debt.
    - Larger firms and those in industries with high leverage tend to have **higher debt**, while firms with high market-to-book ratios (growth firms) tend to have **lower debt**.
3. **Fixed Effects Model (Part d)**
    - Including **firm and year fixed effects** strengthened the finding that **higher profitability leads to lower leverage**.
    - **Industry leverage and firm size remained strong predictors**, while capital expenditure became insignificant.
    - This highlights that **unobserved firm-level and time-specific factors** play a major role in capital structure decisions.

Overall Conclusion & Implications:

- The evidence supports the **pecking order theory**, indicating that **profitable firms prefer to use internal funds rather than taking on additional debt**.
- **Firm size and industry leverage positively affect debt levels**, suggesting that larger firms and firms in capital-intensive industries rely more on leverage.
- The findings emphasize the **importance of controlling for firm-specific and time-specific factors** to avoid biased conclusions in corporate finance research.
- Policymakers and financial analysts should **consider multiple firm characteristics when assessing capital structure decisions**, as profitability alone does not tell the full story.

Final Summary:

- **For beer tax and fatalities**, proper model specification revealed that **higher beer taxes might reduce fatalities**, but **alcohol-related deaths remain the strongest predictor** of vehicle accidents.
- **For capital structure decisions**, more profitable firms **reduce leverage**, supporting the **pecking order theory** over alternative financing theories.
- Both studies demonstrate the **importance of including relevant control variables and fixed effects** to obtain meaningful insights in empirical research.