

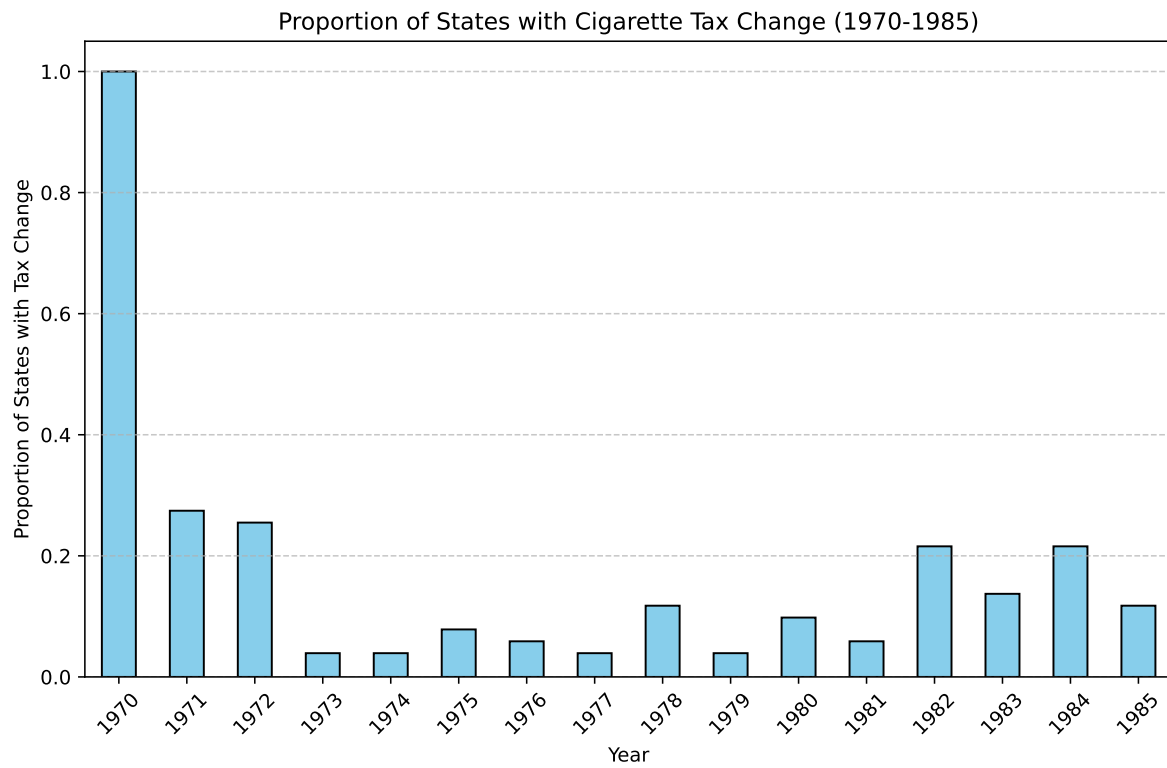
ECON 470 Homework 3-2 Answers

Ilse Novis

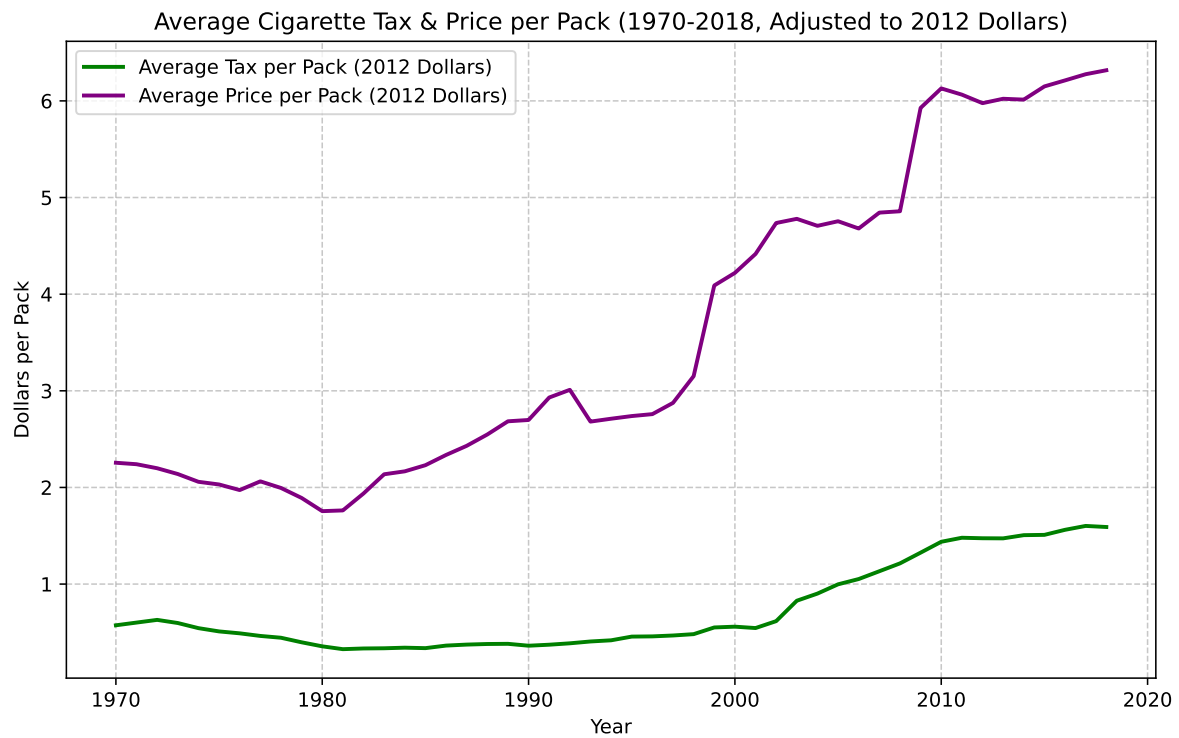
2025-03-19

Summary Statistics

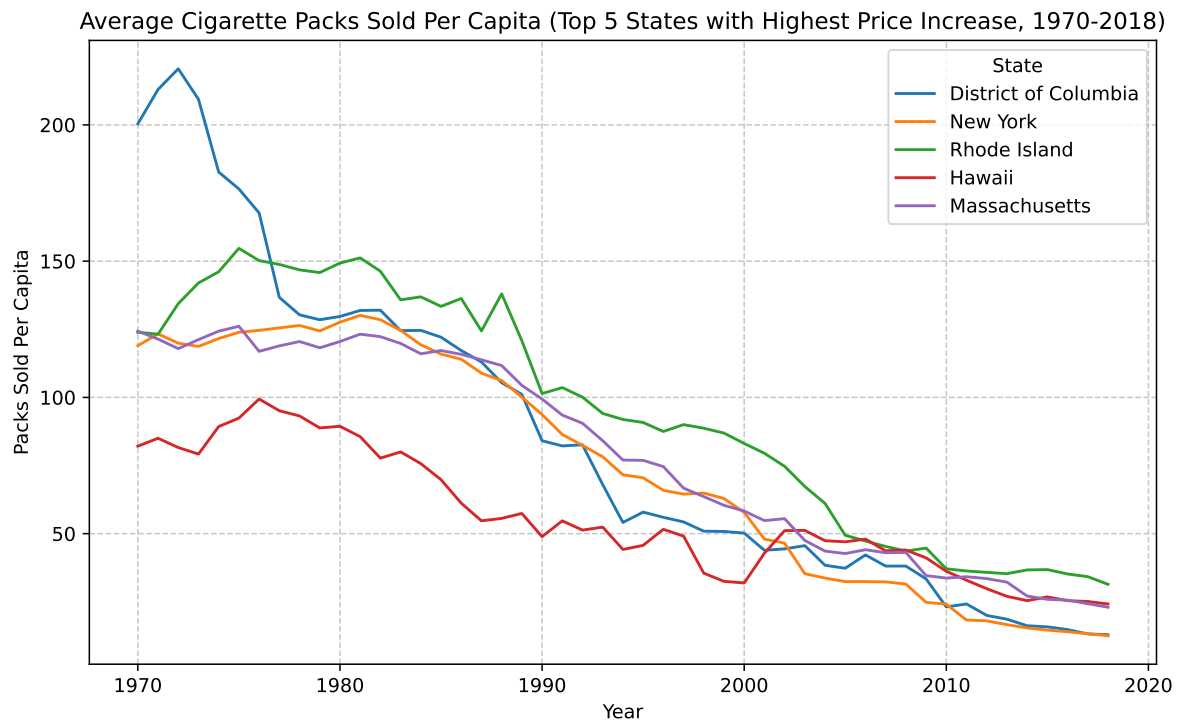
Question 1: Proportion of States with Tax Change (1970-1985)



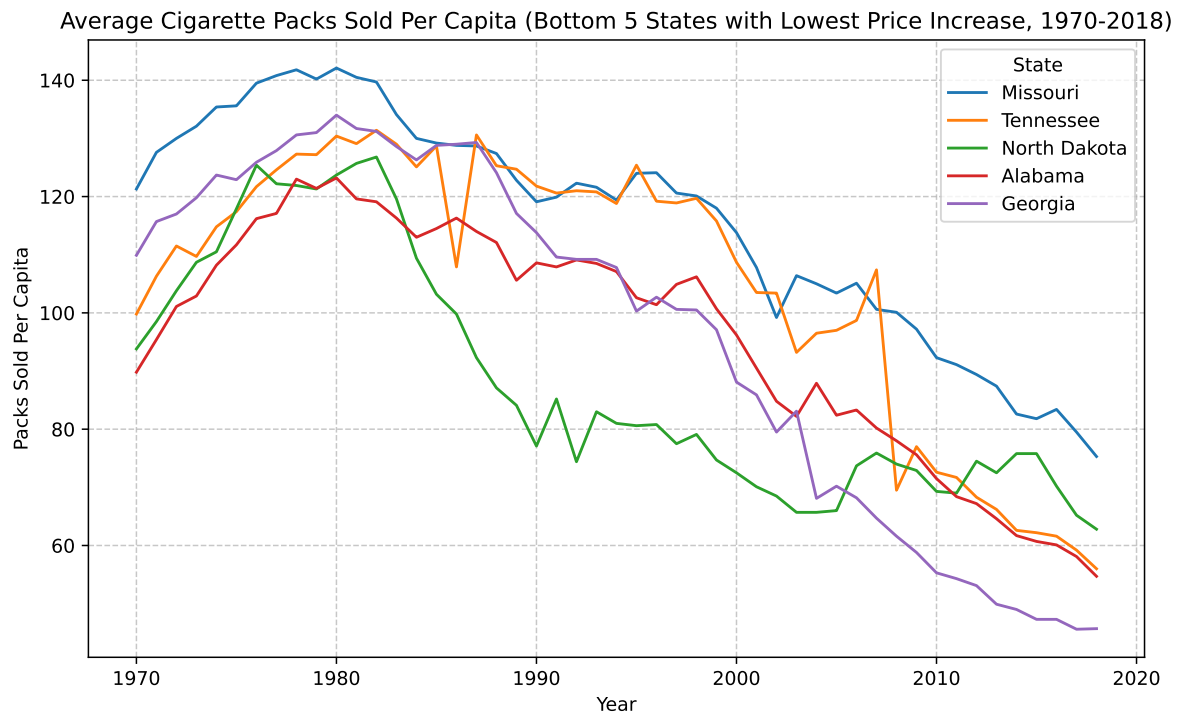
Question 2: Average Tax and Price Trends (1970-2018)



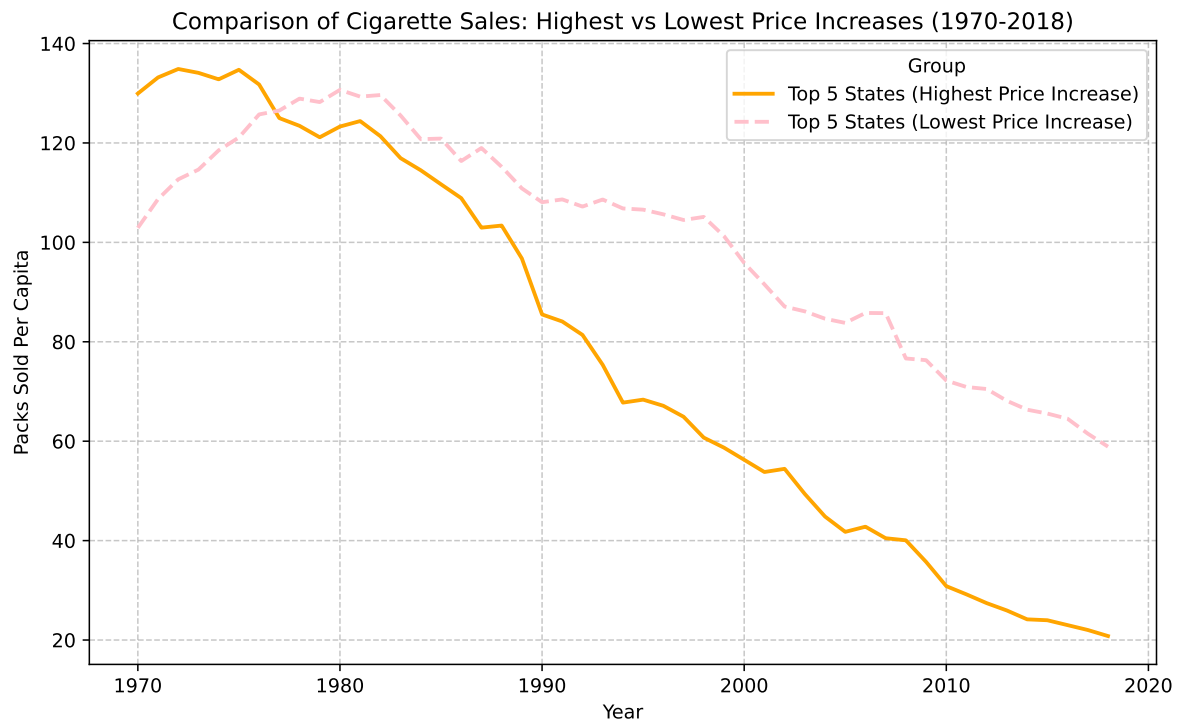
Question 3: Top 5 States with Highest Price Increase (1970-2018)



Question 4: Bottom 5 States with Lowest Price Increase (1970-2018)



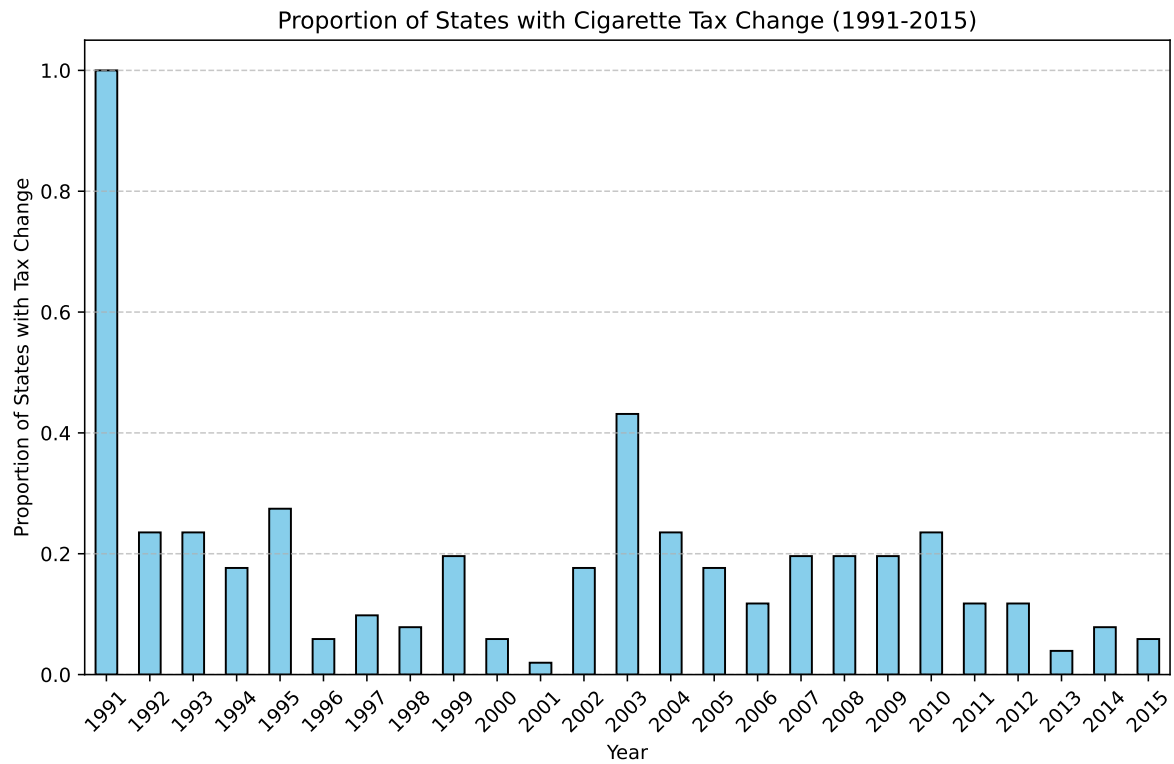
Question 5: Compare the Trends in Sales



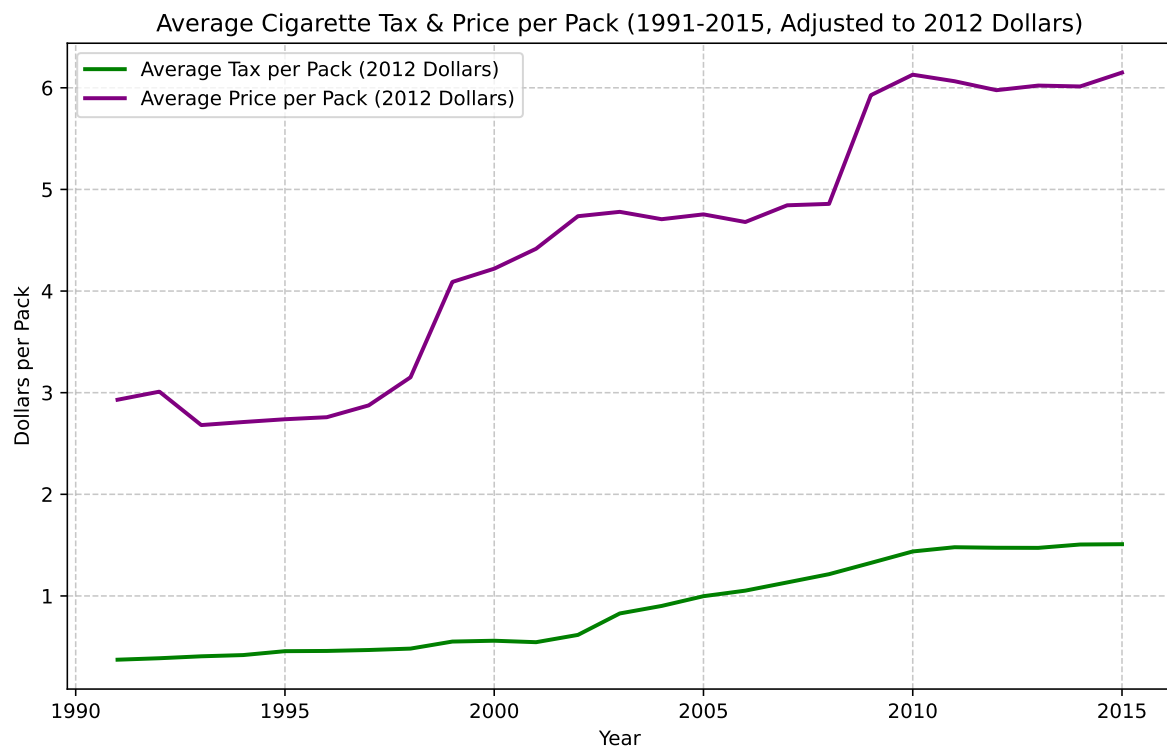
Estimate ATEs

Question 9: Repeat questions 1-3 focusing on the period from 1991 to 2015

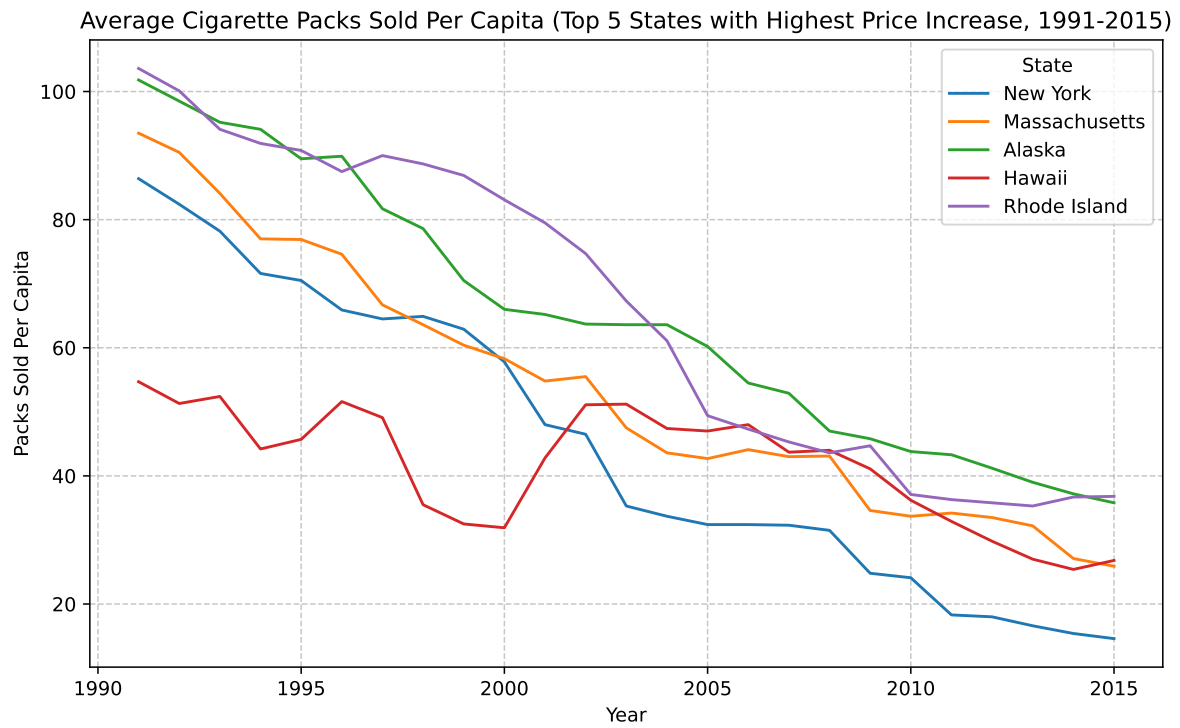
Question 9.1: Proportion of States with a Change in Their Cigarette Tax



Question 9.2: Average Tax and Price Trends (1991-2015)



Question 9.3: Top 5 States with Highest Price Increase (1991-2015)



Question 10: Compare Elasticity Estimates from 1970-1990 vs. 1991-2015

Table 1: Elasticity Estimates from OLS and IV

	1970-1990		1991-2015	
	OLS	IV	OLS	IV
Estimates				
Log Price	-0.809	-0.626	-0.997	-0.231
(SE)	(0.038)	(0.062)	(0.025)	(0.064)
N	1,071	1,071	1,275	1,275
R ²	0.294	0.303	0.561	0.612
Reduced Form				
Log Tax		-0.307		-0.480
(SE)		(0.017)		(0.011)
N		1,071		1,275
R ²		0.236		0.608
First Stage				
Log Tax		0.333		0.432
(SE)		(0.008)		(0.005)
N		1,071		1,275
R ²		0.617		0.868

Interpretation of Results

The regression results show that cigarette demand became **more price-sensitive over time**. The **OLS estimates** indicate that from **1970-1990**, a **1% increase in price reduced sales by 0.81%**, while in **1991-2015**, the decline was **0.997%**. However, the **Instrumental Variables (IV) estimates**, which account for potential price endogeneity, show a lower elasticity of **-0.626 in 1970-1990** and **-0.231 in 1991-2015**, suggesting that tax-driven price changes had a weaker effect on consumption.

The **Reduced Form regression** confirms that higher cigarette taxes led to greater sales declines in **1991-2015 (-0.480)** than in **1970-1990 (-0.307)**. The **First Stage regression** shows that a **1% tax increase raised prices by 0.33% in 1970-1990 and 0.43% in 1991-2015**, with taxes becoming a **stronger predictor of price over time ($R^2 = 0.87$ in later years)**.

Overall, **taxes have become a more effective tool for reducing cigarette consumption**. The stronger price-sales relationship in later years suggests **increased consumer responsiveness**, possibly due to **stricter regulations, industry pricing strategies, or heightened awareness of smoking risks**.