Homework 3

Research in Health Economics, Spring 2025

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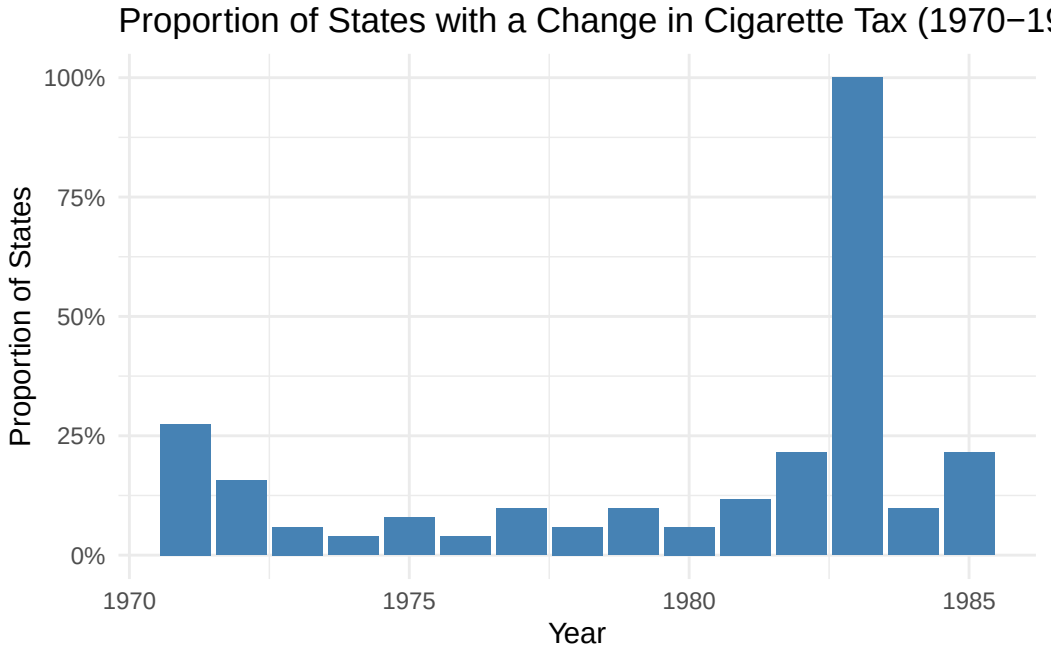
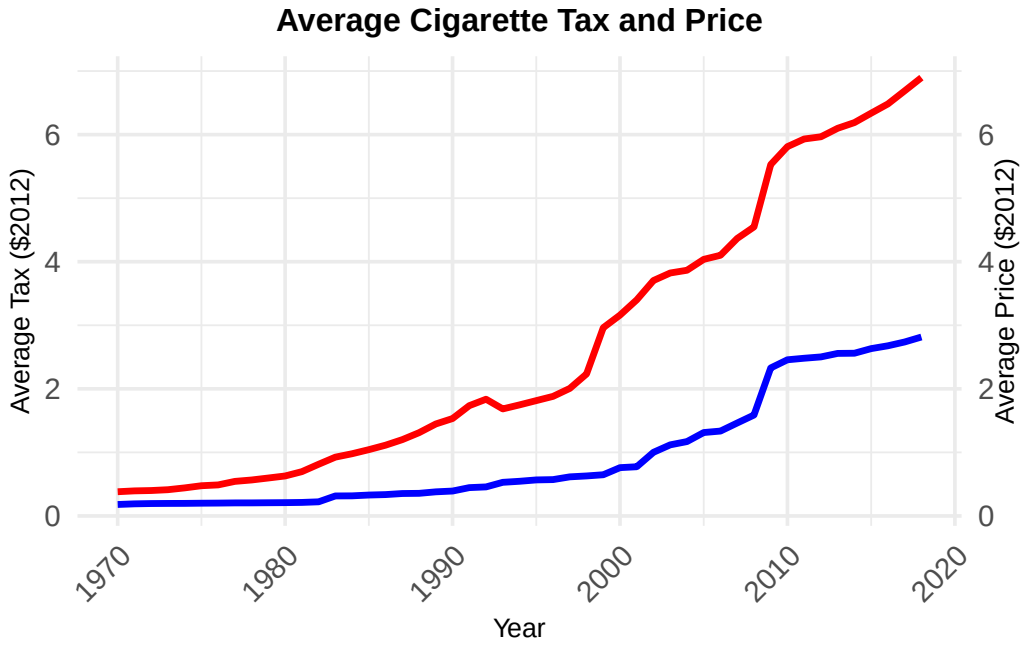
The following is my submission for Homework 3. Note that the setup and analysis for these responses are in a seperate `R` script. The GitHub repository for this work is available here.

Summarize the Data

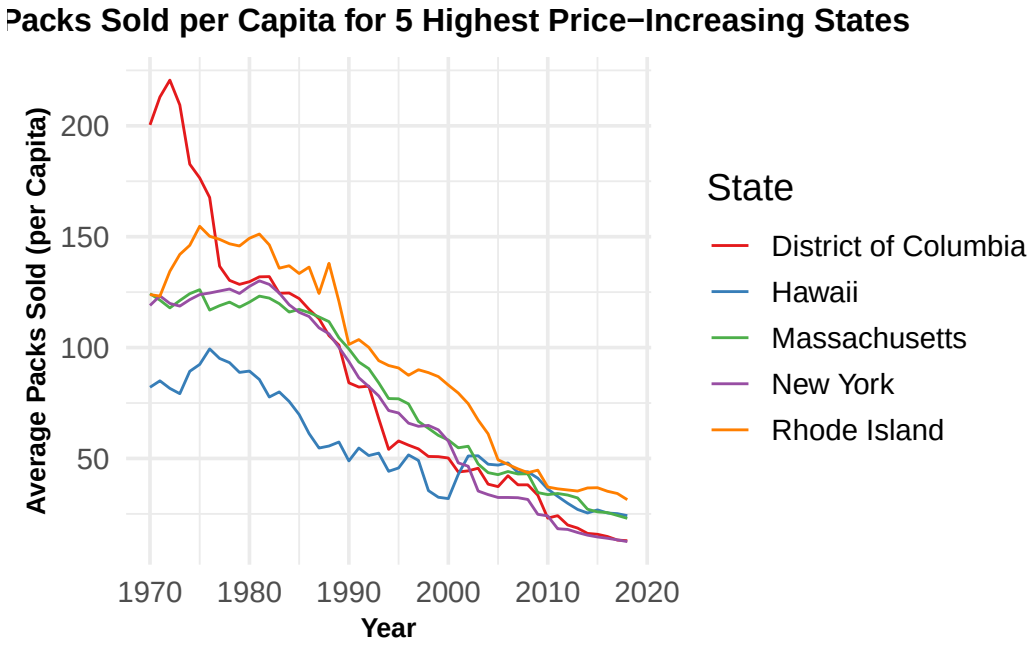
Question 1. Present a bar graph showing the proportion of states with a change in their cigarette tax in each year from 1970 to 1985.



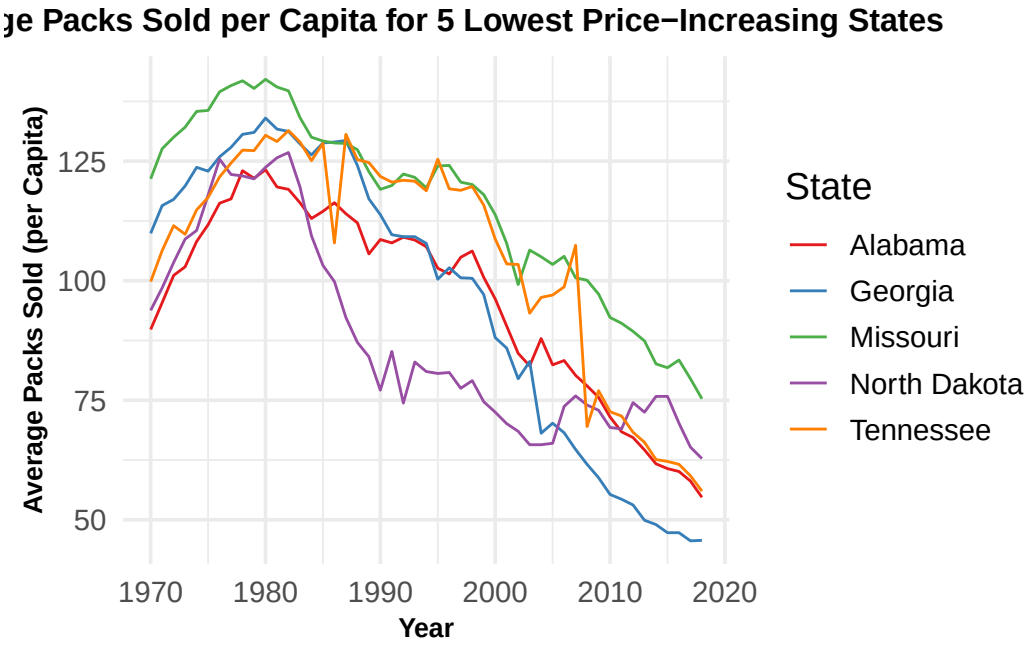
Question 2. Plot on a single graph the average tax (in 2012 dollars) on cigarettes and the average price of a pack of cigarettes from 1970 to 2018.



Question 3. Identify the 5 states with the highest increases in cigarette prices (in dollars) over the time period. Plot the average number of packs sold per capita for those states from 1970 to 2018.



Question 4. Identify the 5 states with the lowest increases in cigarette prices over the time period. Plot the average number of packs sold per capita for those states from 1970 to 2018.



Question 5. Compare the trends in sales from the 5 states with the highest price increases to those with the lowest price increases. There exists more variety between the states with the

lowest price increases than those with the highest. Considering the bottom five states are more rural than their top 5 counterparts, this could demonstrate differences in economic structures and demographics. Sales decline sharply among the highest price states, while lowest price states demonstrate a steady decline. All states sell the most packs around 1980s.

Estimate ATEs

Question 6. Focusing only on the time period from 1970 to 1990, regress log sales on log prices to estimate the price elasticity of demand over that period. Interpret your results.

Table 1: Log Sales on Log Price Regression Results

term	estimate	std.error	statistic	p.value
Intercept	4.750	0.008	585.32	0
2012 Price (log)	-0.172	0.014	-12.40	0

I am interpreting my results.

Question 7. Again limiting to 1970 to 1990, regress log sales on log prices using the total (federal and state) cigarette tax (in dollars) as an instrument for log prices. Interpret your results and compare your estimates to those without an instrument. Are they different? If so, why?

Table 2: Log Sales on Log Price Regression with Instrument Results

term	estimate	std.error	statistic	p.value
ln_price_2012	0.059	0.049	1.2	0.235

I am interpreting results.

Question 8. Show the first stage and reduced-form results from the instrument.

Table 3: First Stage Results from Instrument

term	estimate	std.error	statistic	p.value
Intercept	1.179	0.033	35.71	0
2012 Tax (log)	1.080	0.023	47.97	0

Table 4: Reduced-Form Results from Instrument

term	estimate	std.error	statistic	p.value
Intercept	4.375	0.025	176.63	0
2012 Tax (log)	-0.307	0.017	-18.17	0

Question 9. Repeat questions 6-8 focusing on the period from 1991 to 2015.

Table 5: Log Sales on Log Price Regression Results: 1991-2015

term	estimate	std.error	statistic	p.value
Intercept	5.039	0.023	219.93	0
2012 Price (log)	-0.666	0.017	-38.09	0

Table 6: Log Sales on Log Price Regression with Instrument: 1991-2015

term	estimate	std.error	statistic	p.value
ln_price_2012	-0.103	0.058	-1.78	0.077

Table 7: First Stage Results from Instrument: 1991-2015

term	estimate	std.error	statistic	p.value
Intercept	1.207	0.005	242.91	0
2012 Tax (log)	0.630	0.007	91.88	0

Table 8: Reduced Form Results from Instrument: 1991-2015

term	estimate	std.error	statistic	p.value
Intercept	4.237	0.008	540.26	0
2012 Tax (log)	-0.480	0.011	-44.41	0

Question 10. Compare your elasticity estimates from 1970-1990 versus those from 1991-2015. Are they different? If so, why?