

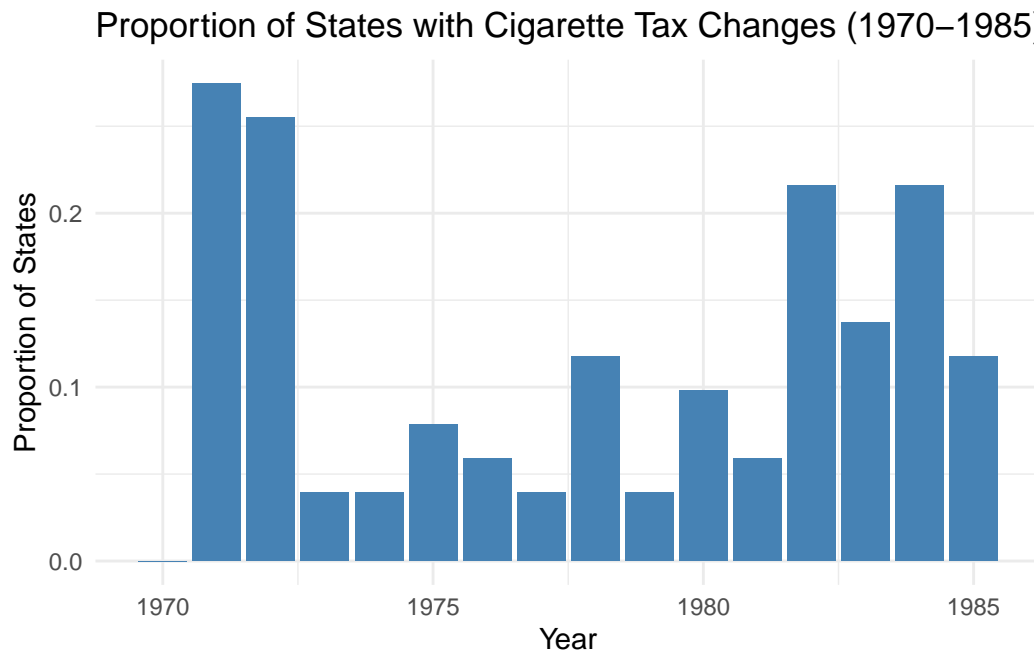
# Homework 3

Research Methods, Spring 2025

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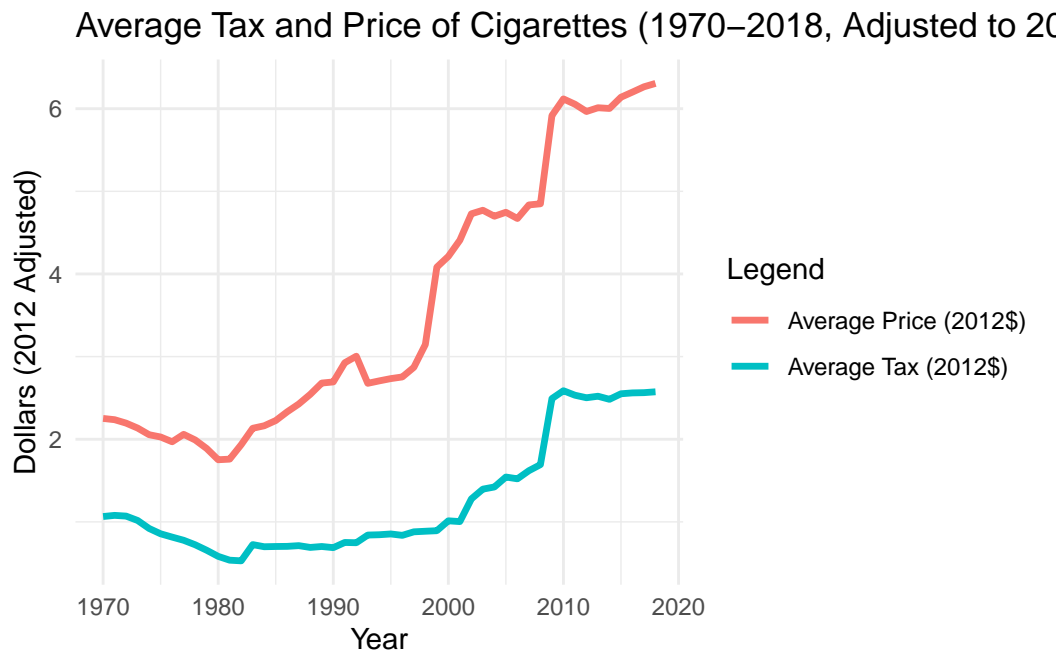
My answers to the homework questions are described below. The GitHub repository for this work is available [here](#). Enjoy!

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

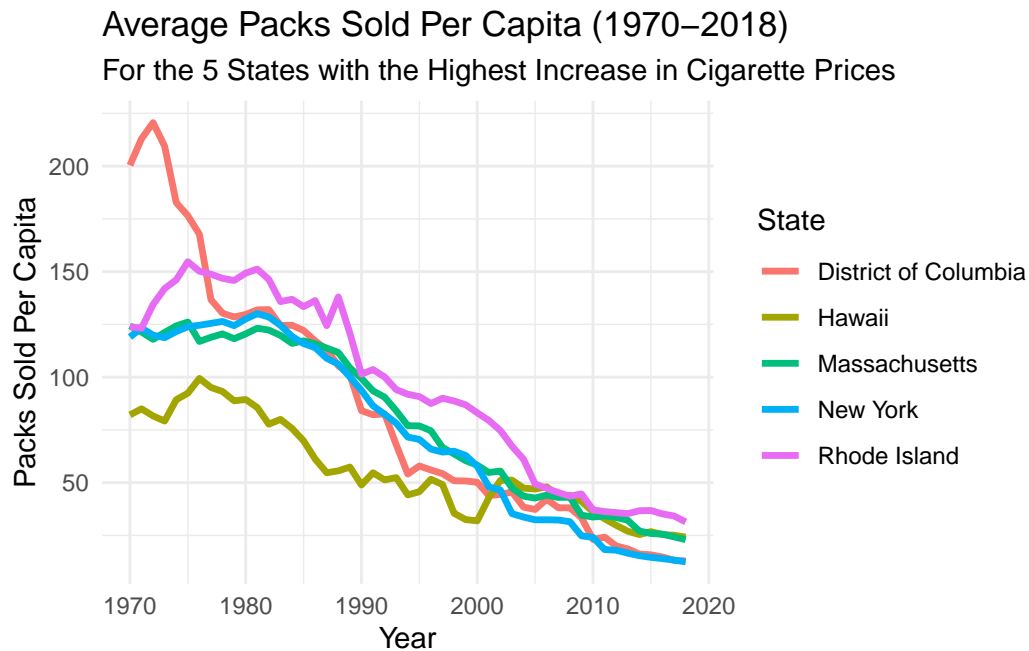


**2. Plot on a single graph the average tax (in 2012 dollars) on cigarettes and the average price of a pack of cigarettes from 1970 to 2018.**

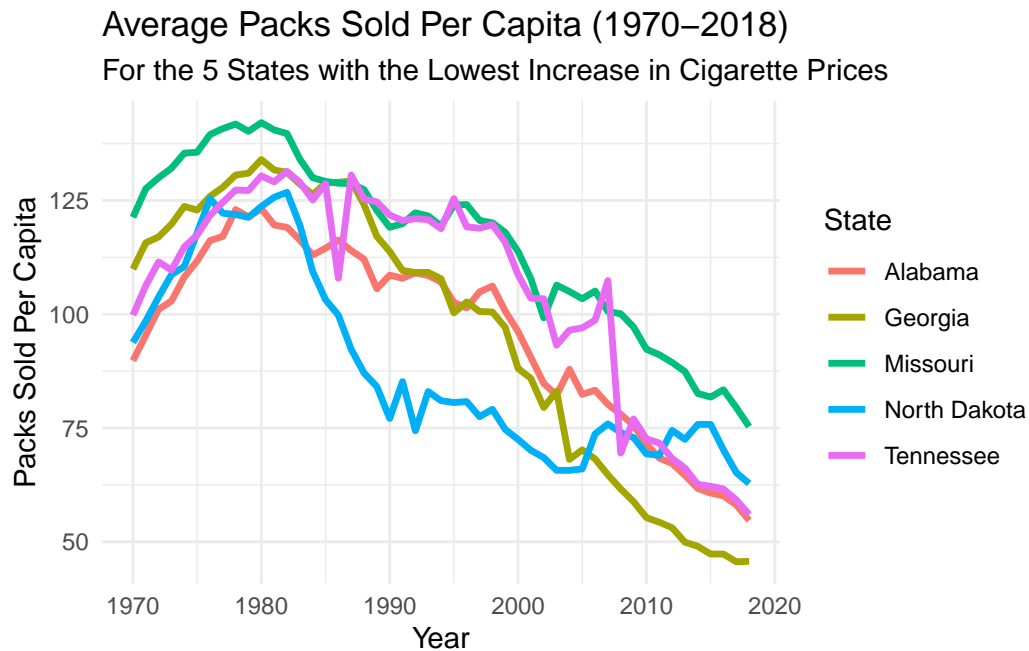
Warning: Using `size` aesthetic for lines was deprecated in ggplot2 3.4.0.  
i Please use `linewidth` instead.



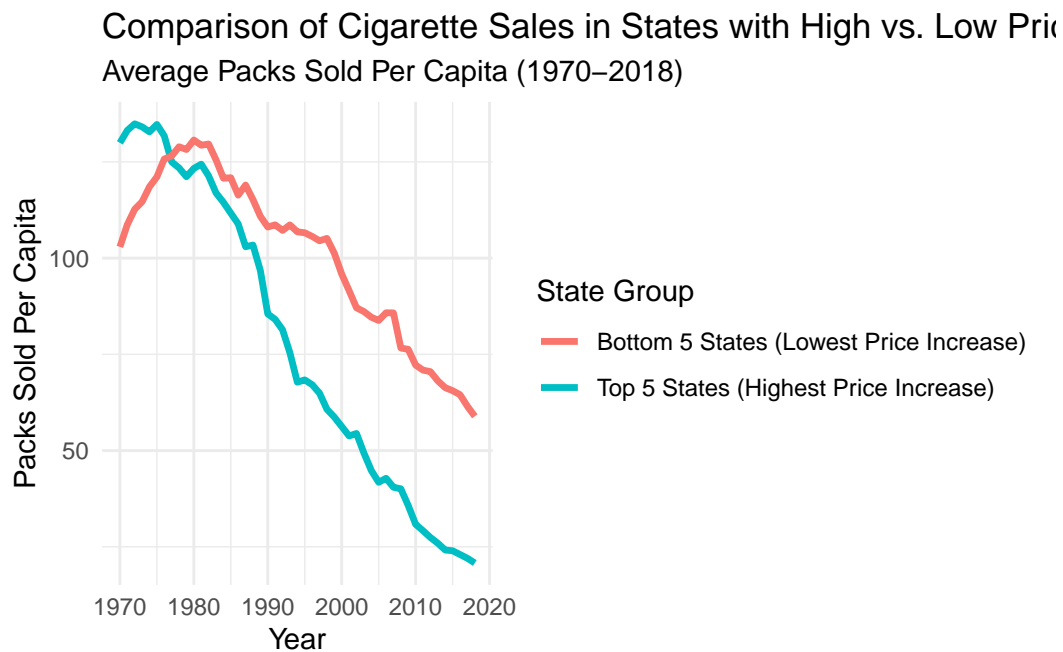
**3. Identify the 5 states with the highest increases in cigarette prices (in dollars) over the time period. Plot the average number of packs sold per capita for those states from 1970 to 2018.**



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.



**5. Compare the trends in sales from the 5 states with the highest price increases to those with the lowest price increases.**



**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.**

**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?**

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

**6-9. The estimates for the regressions run in questions 6-9 are shown in the table below.**

Regression Estimates (OLS & IV)  
1970-1990 and 1991-2015

	OLS	IV	OLS	IV
Log Price	-0.809*** (0.038)	-0.796*** (0.071)	-0.997*** (0.025)	-1.150*** (0.028)
Num.Obs.	1071	1071	1275	1275
R2	0.294	0.294	0.561	0.548
F	445.128		1629.715	
Std.Errors		IID		IID

+  $p < 0.1$ , \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$