Hwk3

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1 Summarize the Data

1.1 Present a bar graph showing the proportion of states with a change in their cigarette tax in each year from 1970 to 1985.
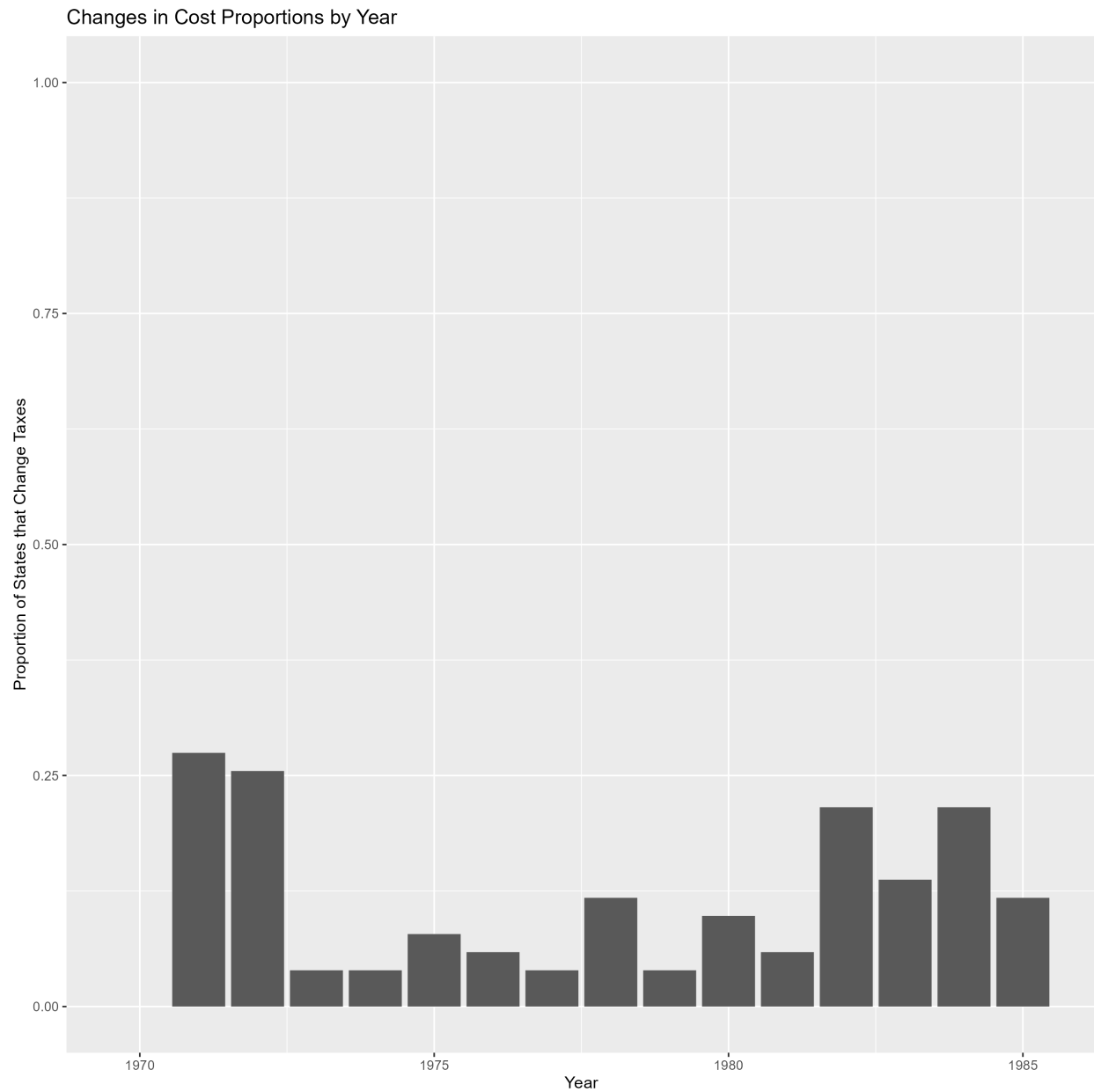
Changes in Cost Proportions by Year

Figure 1: Proportion of States that Changed Cigarette Taxes Each Year from 1970 to 1985

This bar chart demonstrates the proportion of states that did not change taxes each year.

1.2 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.
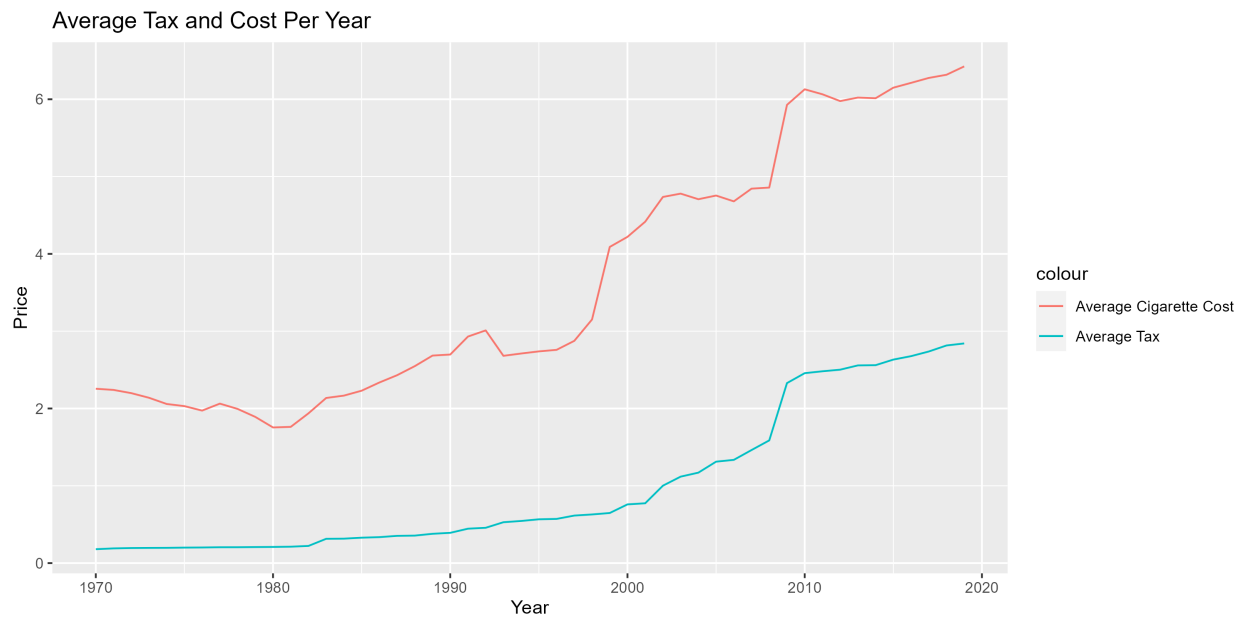

Figure 2: Average Tax and Price of Cigarettes from 1970 to 2020

This graph shows the average tax and cost of cigarettes over the years.

1.3 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.
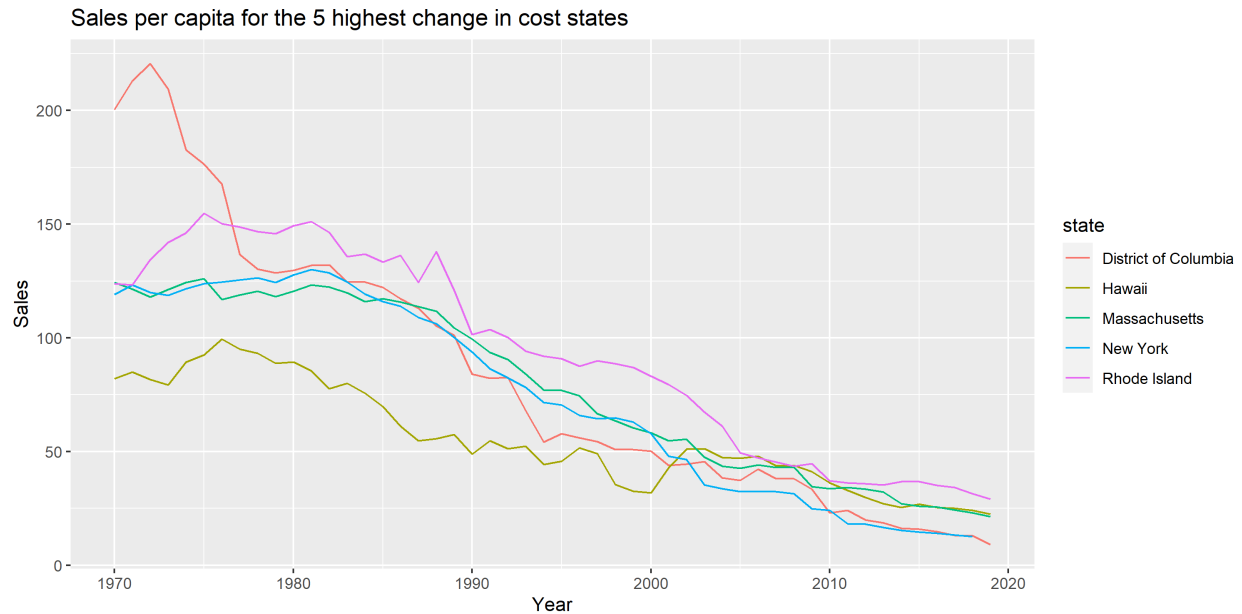

Figure 3: Sales of Cigarettes Per Capita of the Top 5 States' Change in the Price of Cigarettes From 1970 to 2020

This chart shows the 5 states that had the largest difference in the price of cigarettes from 1970 and 2019 and the sales of cigarettes per capita in that time frame.

1.4 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.
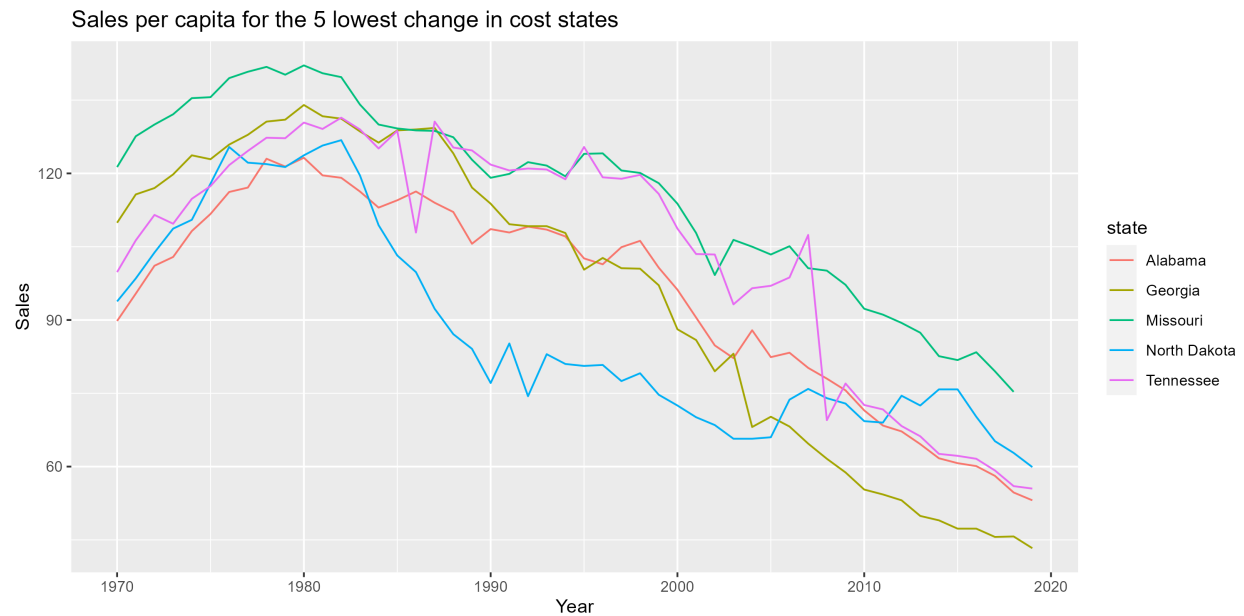

Figure 4: Sales of Cigarettes Per Capita of the Bottom 5 States' Change in the Price of Cigarettes From 1970 to 2020

This chart is very similar except it shows the 5 states with the lowest change in price in those years, as well as their sales per capita.

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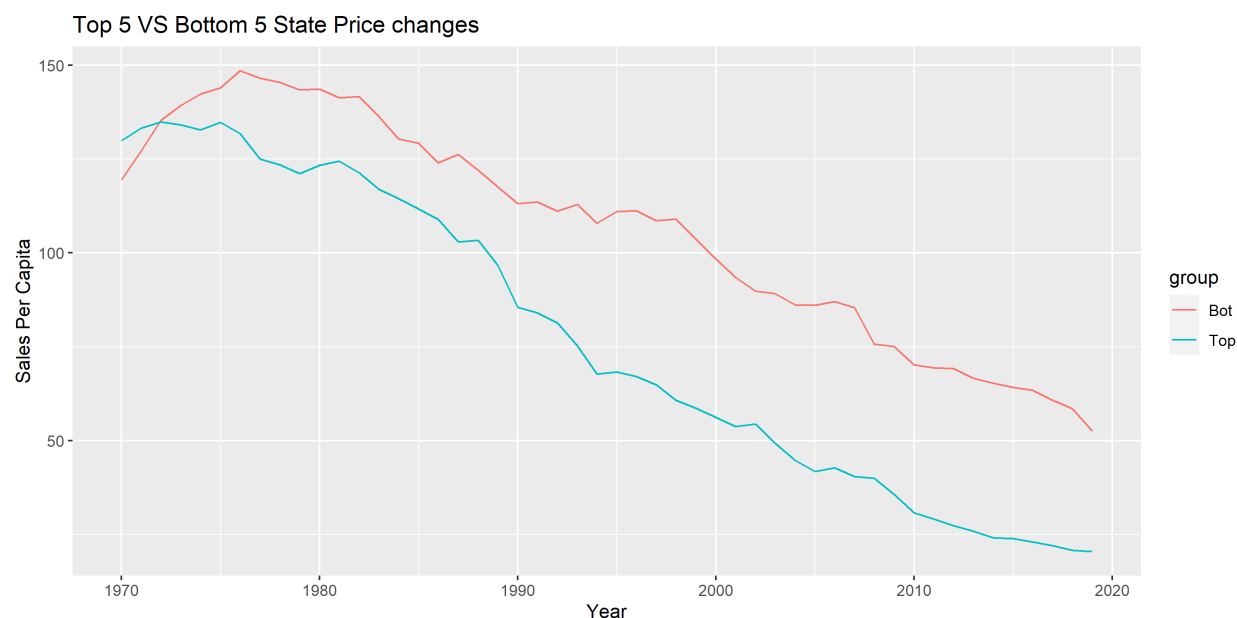

Figure 5: Highest Versus Lowest Change in Taxes States Compared on Sales Per Capita

Both groups of states, those with higher changes in costs and lower, saw a decrease in sales per capita of cigarettes over the years. They both start at similar values but near the end, the sales per capita for the states with less change saw also a higher sales per capita at around 50-75. Those with higher changes of cigarette cost saw a larger decrease with the sales per capita ending around 25.

2 Average Treatment Effects

2.1 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.

This shows that as the log of the price of a pack of cigarettes increases, the log of the sales per capita of cigarette packs decreases by .17 packs per capita. This would mean that cigarettes are an elastic good.

Table 1: OLS estimate From 1970 to 1990

	(1)
Log Price	−0.172
	(0.014)
N	1071
R^2	0.13

2.2 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?

These results are similar to the previous, except the effect seems to be stronger when using an instrumental variable. Both coefficients are negative and are statistically significant in both estimates, but when using an IV we see a stronger effect. This makes sense as it takes into account a difference in something external affecting price that does not directly affect a change in consumption.

Table 2: IV estimate From 1970 to 1990

	(1)
Log Price	−0.736
	(0.075)
N	1071
R^2	0.29

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

Table 3: First Stage and Reduced Form estimates from the Instrument

	First Step	Reduced Form
Total Tax	0.327	−0.241
	(0.017)	(0.028)
N	1071	1071
R^2	0.26	0.06

2.4 Repeat questions 1-3 focusing on the period from 1991 to 2015.

This shows that as the log of the price of a pack of cigarettes increases, the log of the sales per capita of cigarette packs decreases by .66 packs per capita. This would mean that cigarettes are an elastic good.

Table 4: OLS and IV Estimates From 1970 to 1990

	OLS	IV
Log Price	−0.997	−1.164
	(0.025)	(0.029)
N	1275	1275
R^2	0.56	0.55

These results are similar to the previous, except the effect seems to be stronger when using an instrumental variable. Both coefficients are negative and are statistically significant in both estimates, but when using an IV we see a stronger effect. This makes sense as it takes into account a difference in something external affecting price that does not directly affect a change in consumption.

Table 5: First Stage and Reduced Form estimates from the Instrument

	First Step	Reduced Form
Total Tax	0.308	−0.358
	(0.005)	(0.008)
N	1275	1275
R^2	0.76	0.58

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

There is a large difference in the elasticity between the two time periods. As time went on, cigarettes became a much more elastic good, meaning, as prices increased, people were less likely to consume cigarettes. I assume this may be due to more information coming out about the health detriments of cigarettes which then made it more motivating for people to quit so as prices went up, people became more willing to quit, or at least consume less.