Homework Three Submission 1

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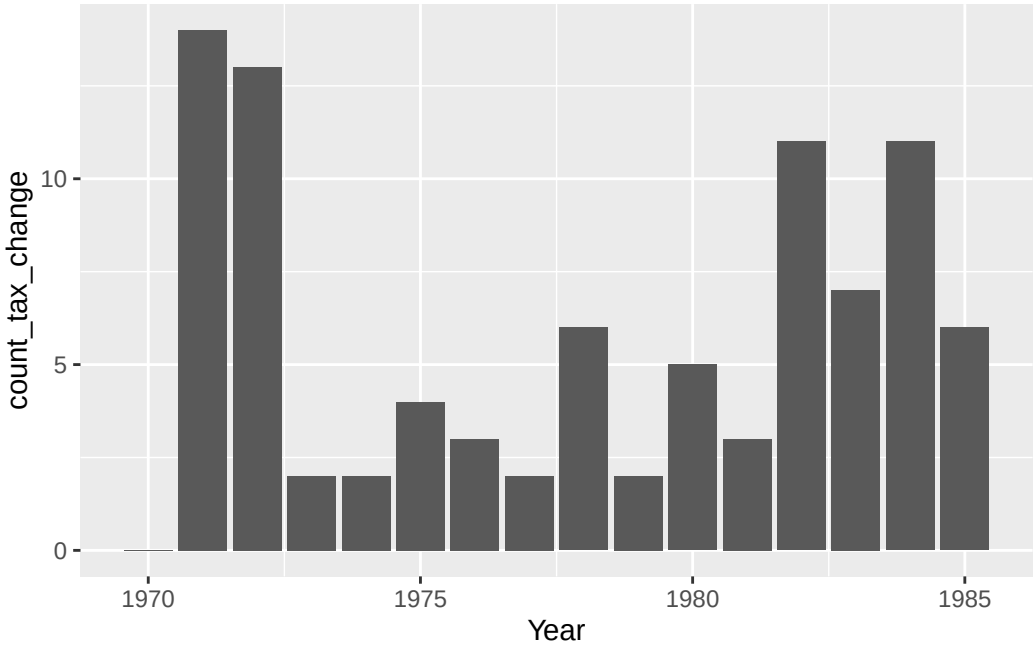
This is my first submission of the third homework for Econ 470.

Link to Github

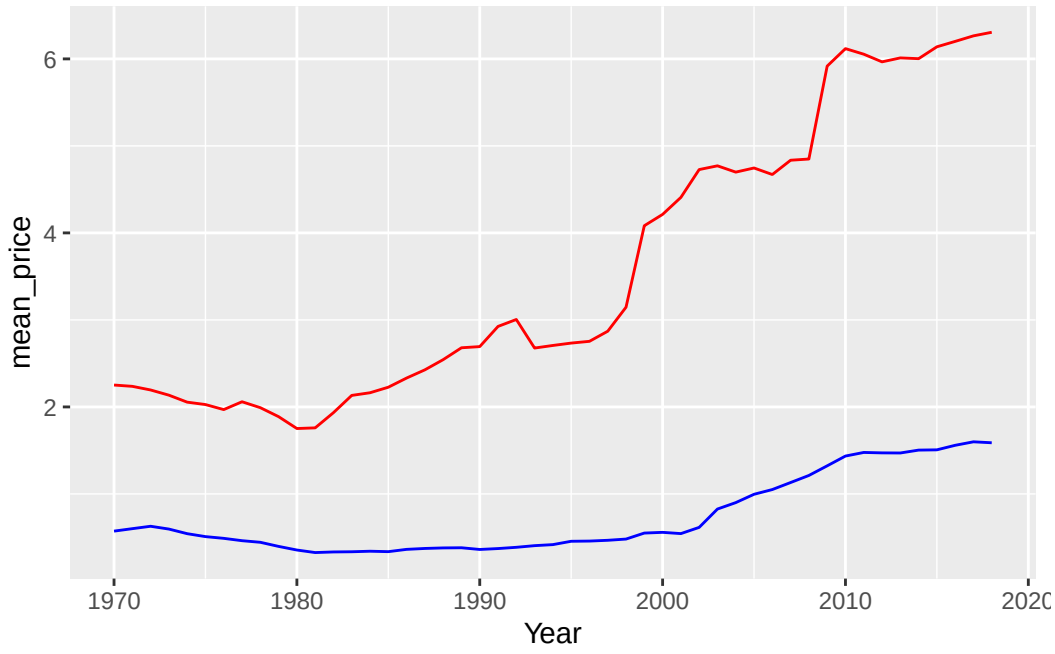
https://github.com/safiaread/homework-3

Summarize the data

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.



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.

```
# A tibble: 5 x 2
# Groups:   state [5]
  state                price_change
  <chr>                       <dbl>
1 District of Columbia         7.09
2 New York                     6.99
3 Rhode Island                 6.40
4 Hawaii                       6.35
5 Massachusetts                6.35
```

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.

```
# A tibble: 5 x 2
# Groups:   state [5]
  state        price_change
  <chr>               <dbl>
1 Missouri             2.36
2 Tennessee            2.37
3 North Dakota         2.49
```

```
4 Alabama              2.55
5 Georgia              2.66
```

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

In both groups, average packs sold decreased. However in the states with the lowest price increases, there are still more sales per capita on average.

Estimate ATEs

Now let's work on estimating a demand curve for cigarettes. Specifically, we're going to estimate the price elasticity of demand for cigarettes. When explaining your findings, try to limit your discussion just to a couple of sentences.

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.

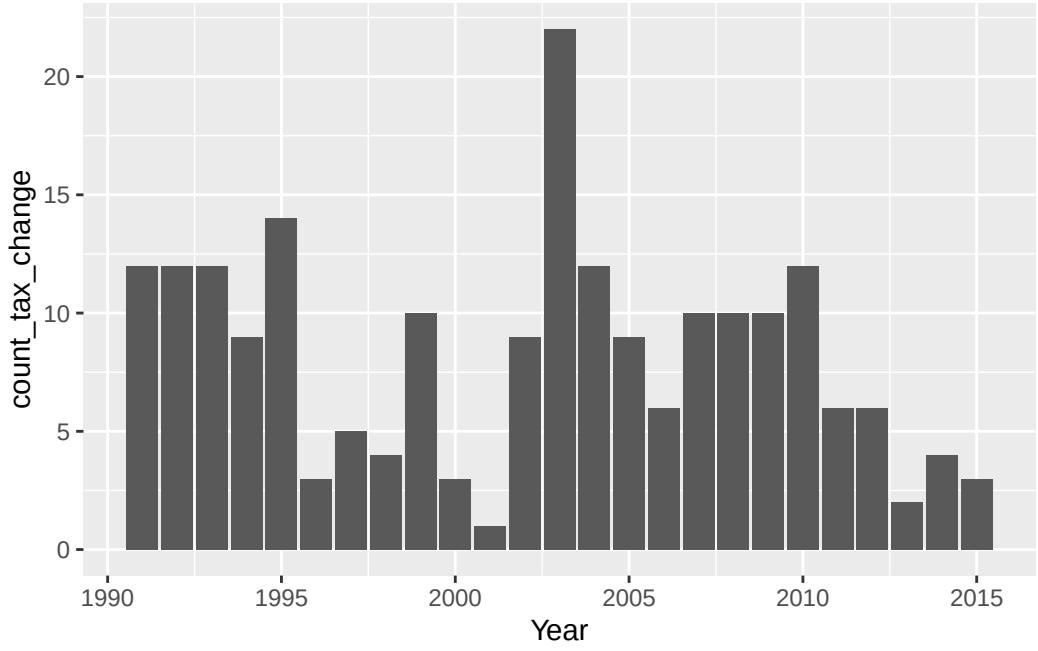
The beta1 is -0.8094, which suggests sales and price have an inverse relationship. As price increases we can expect sales to decrease.

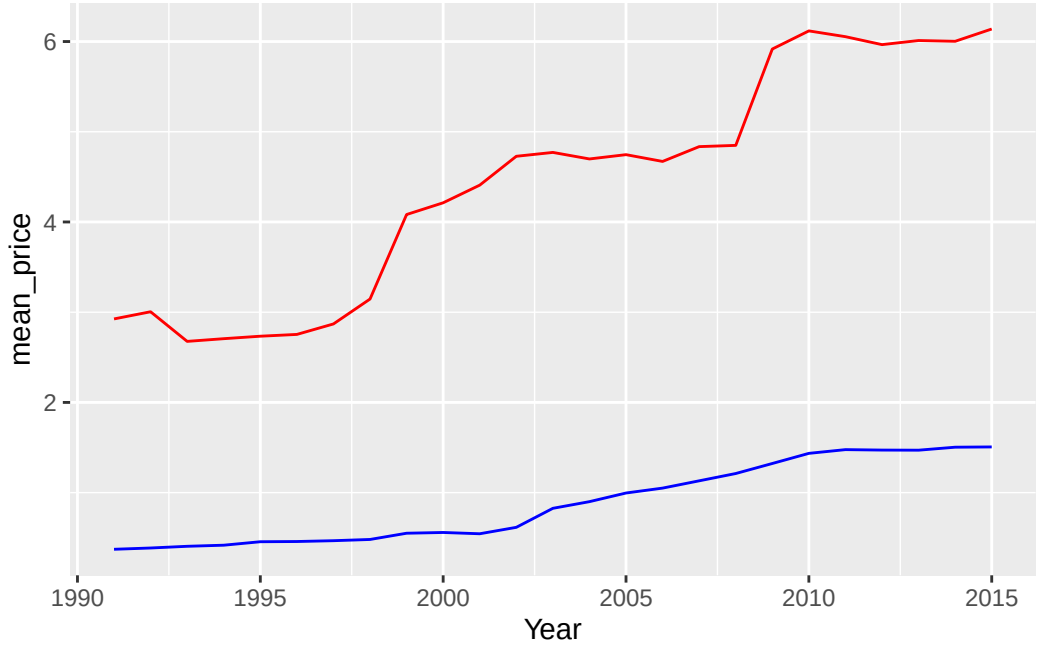
```
Call:
lm(formula = q6$ln_sales ~ q6$ln_price)

Coefficients:
(Intercept)  q6$ln_price
     5.4274      -0.8094
```

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.

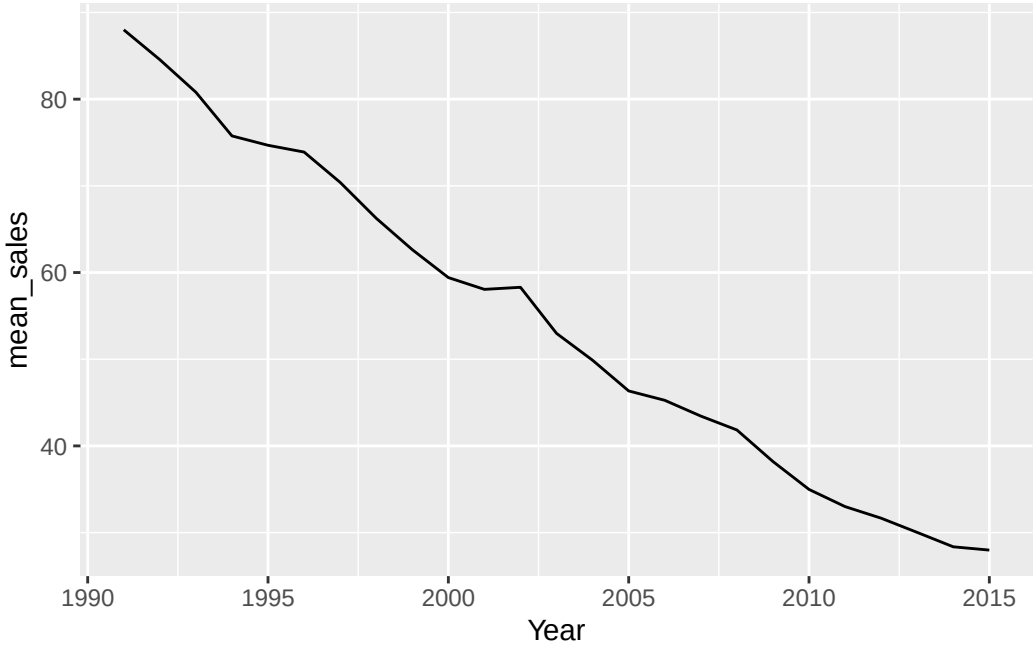
9. Repeat questions 1-3 focusing on the period from 1991 to 2015.



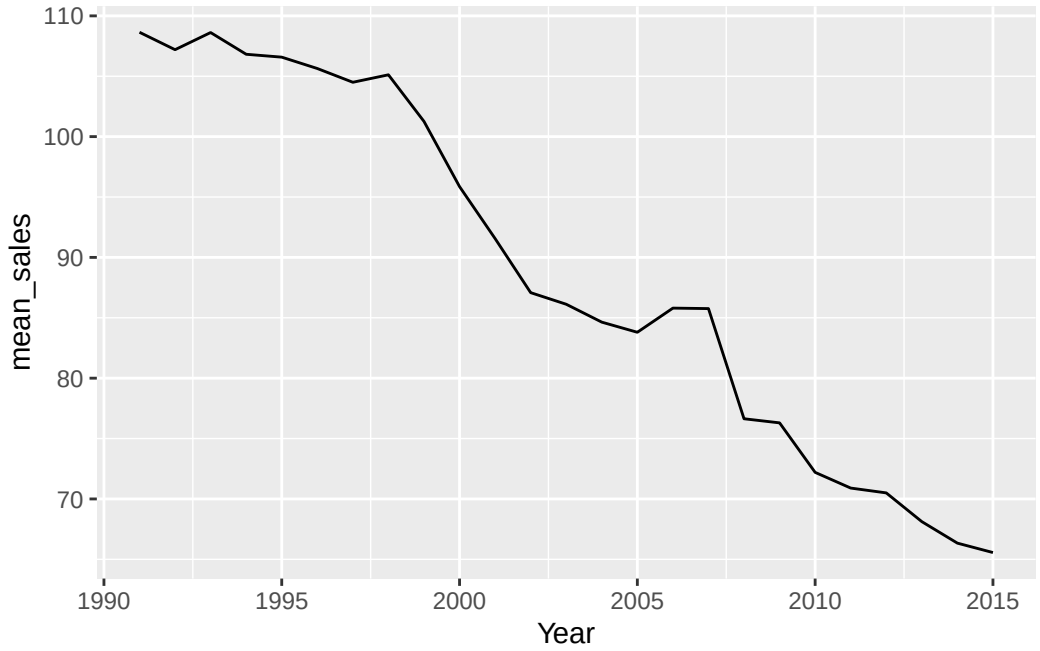



```
# A tibble: 5 x 2
# Groups:   state [5]
  state         price_change
  <chr>                <dbl>
1 New York              6.49
```

```
2 Massachusetts         5.69
3 Alaska                5.24
4 Hawaii                5.20
5 Rhode Island          5.15
```




```
# A tibble: 5 x 2
# Groups:   state [5]
  state        price_change
  <chr>               <dbl>
1 North Dakota         1.72
2 Missouri             1.81
3 Georgia              1.98
4 California           2.03
5 Tennessee            2.07
```



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