

# Homework 3 - Research in Health Economics

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## 1 Summarise the Data

### 1.1 Question 1

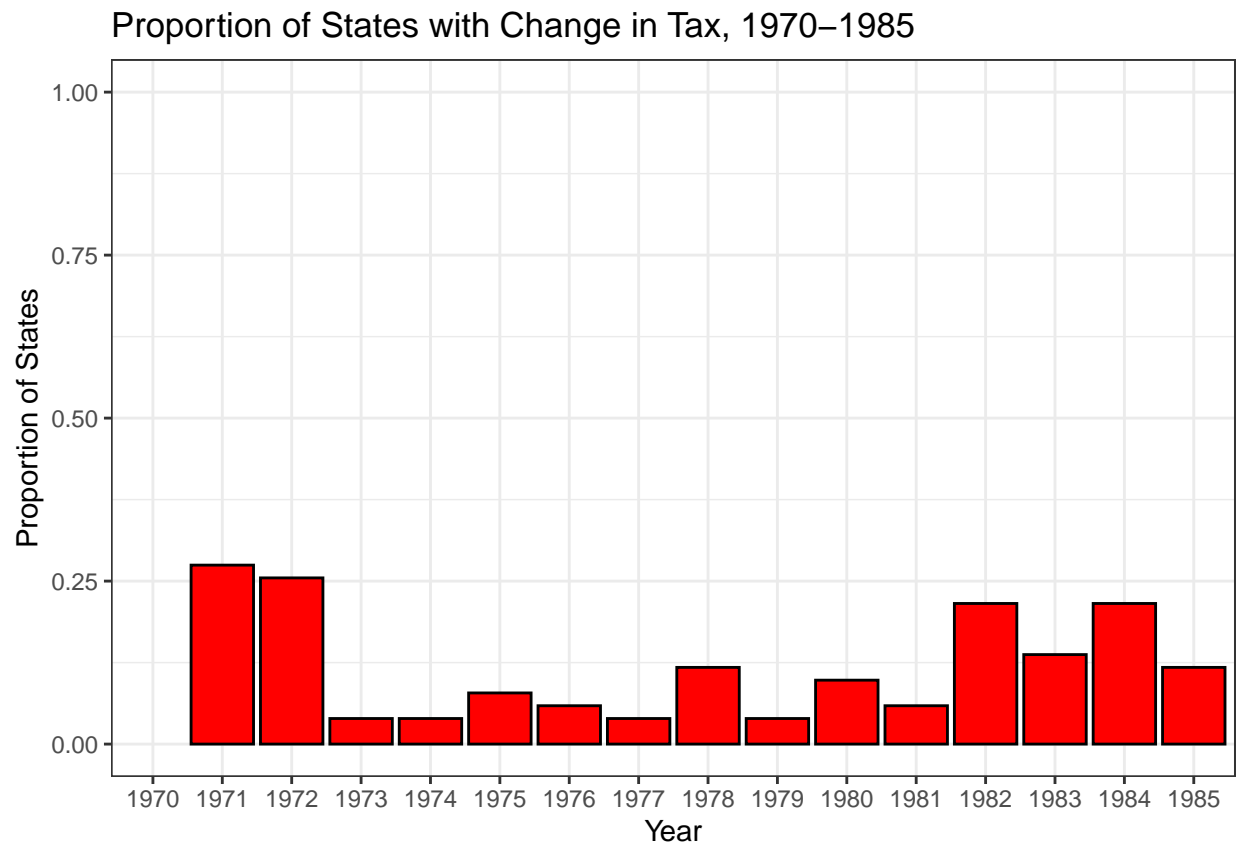
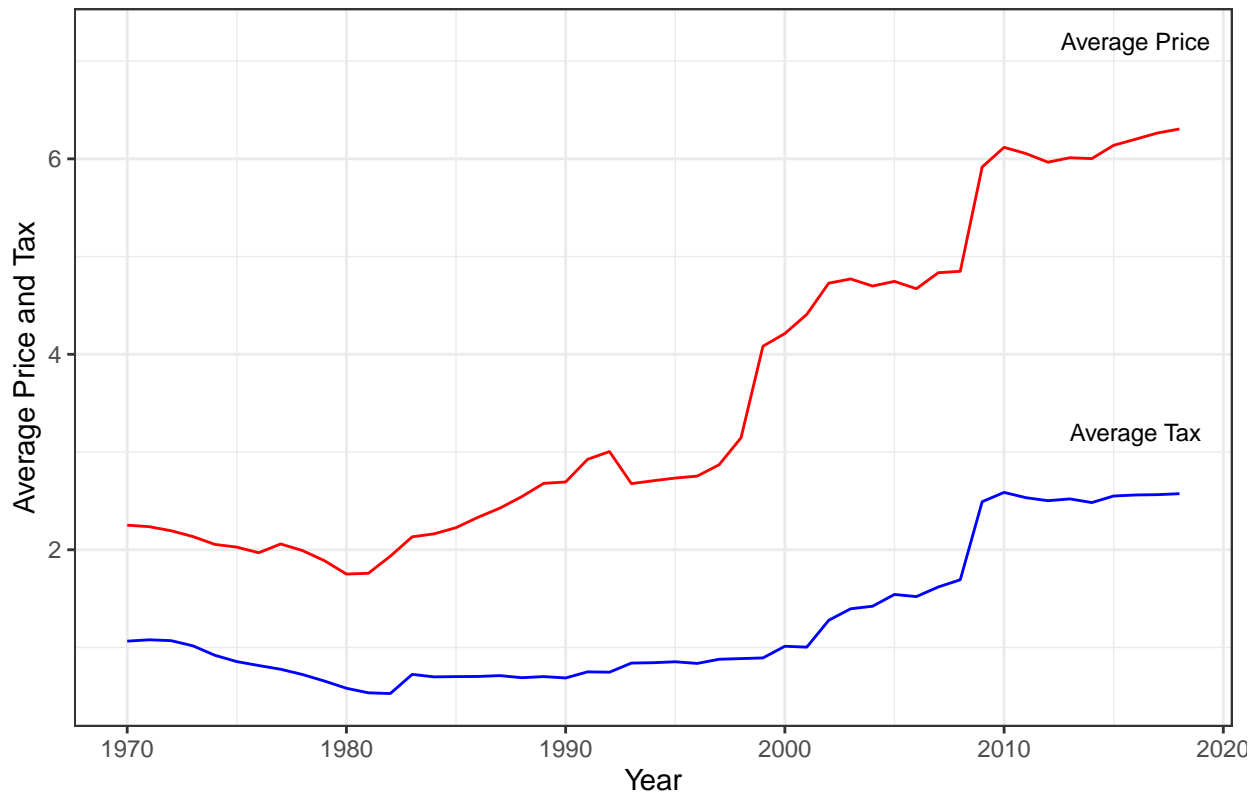


Figure 1: (#fig:fig\_1)Proportion of States with Change in Tax, 1970-1985

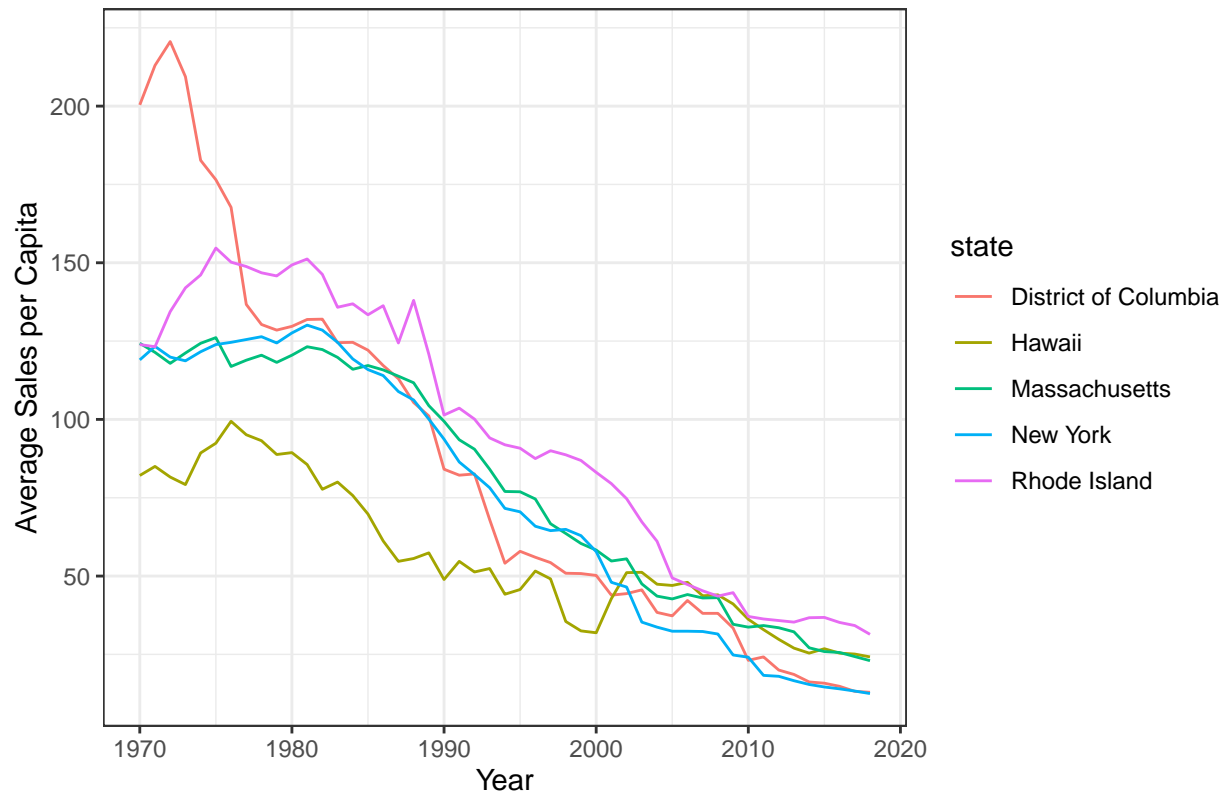
## 1.2 Question 2

Average Price and Tax from 1970–2018



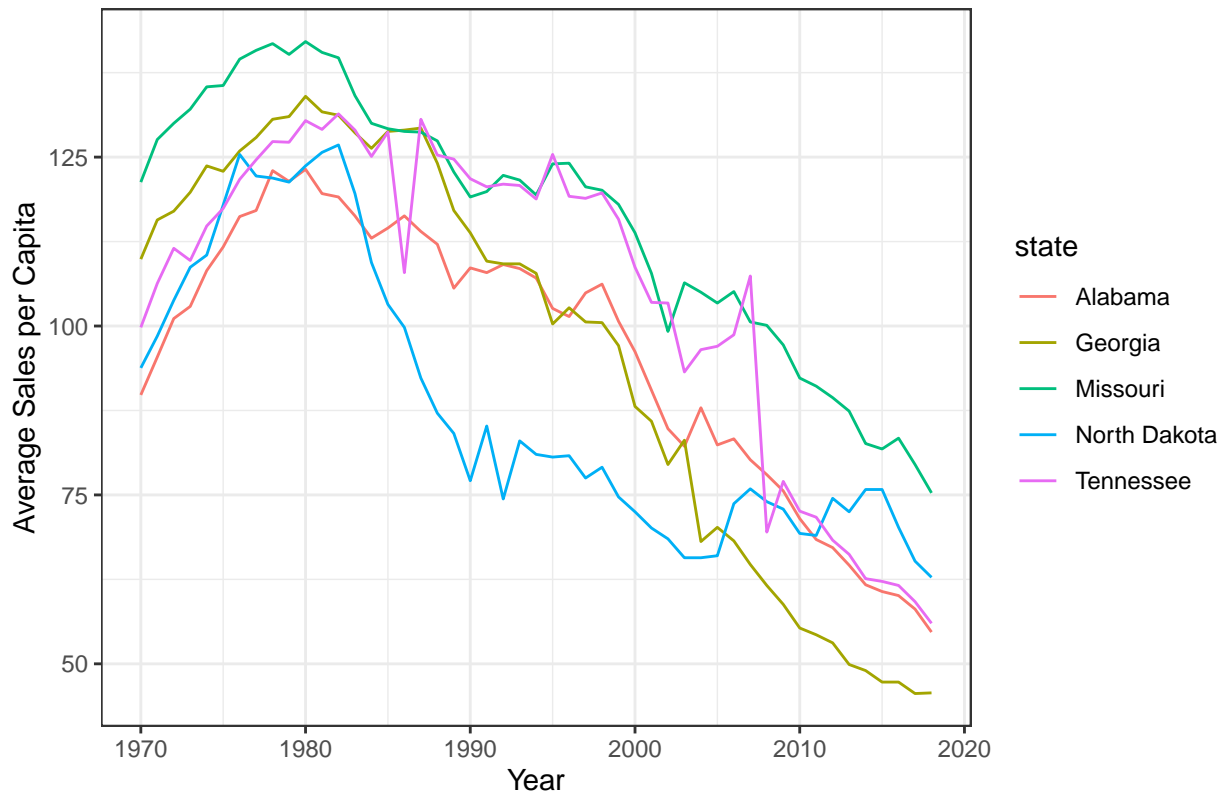
### 1.3 Question 3

#### Average Sales per Capita



#### 1.4 Question 4

##### Average Sales per Capita



#### 1.5 Question 5

A graph showing the average sale of cigarettes in the 5 with states with highest and lowest tax change is shown in Figure 2. It shows the states with the highest change in tax had a more drastic fall in average sales between 1970 and 2018 compared to the states with the lowest change in tax. The average sales of cigarettes in the top 5 states is lower than the average sale in the bottom 5 states from the late 1970s onwards.

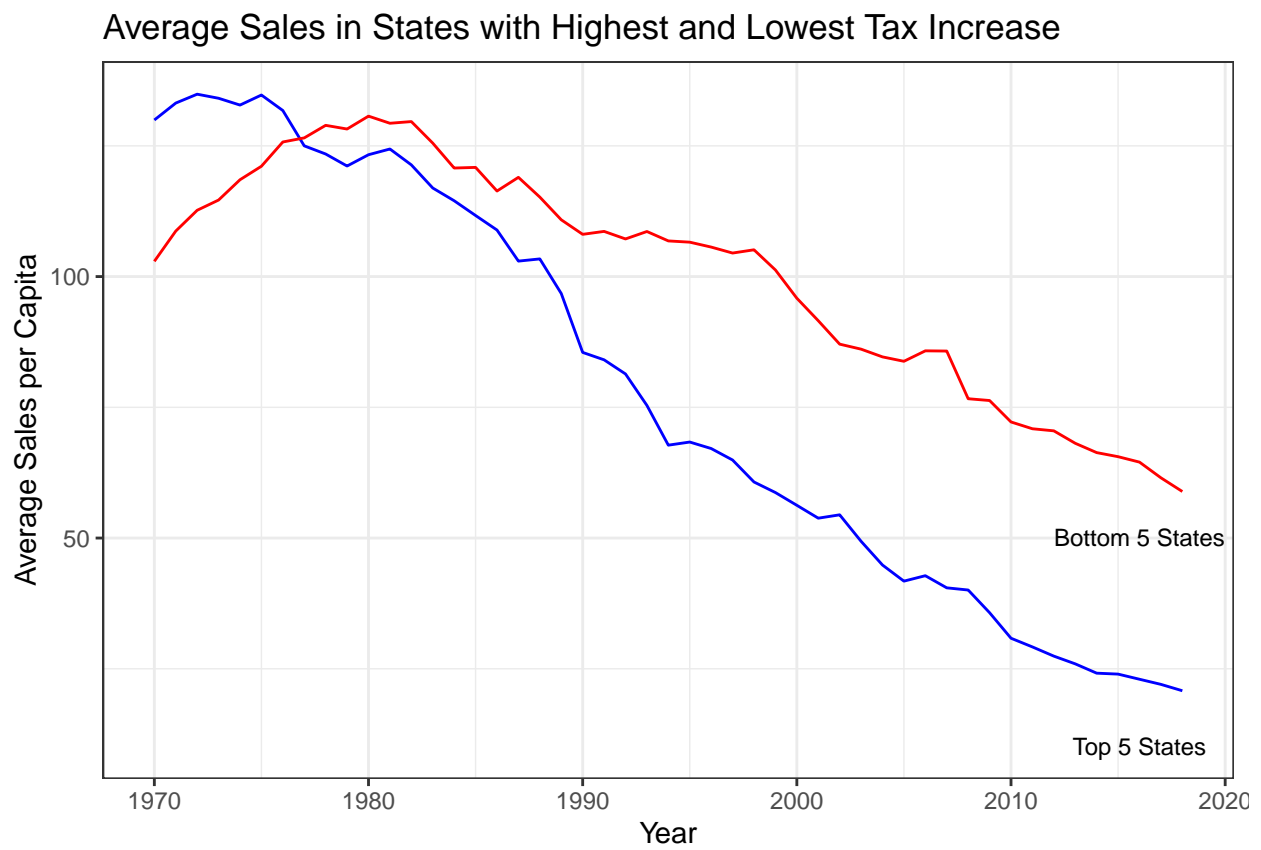


Figure 2: Average Sales in Top and Bottom States

## 2 Estimate ATEs

### 2.1 Question 1

Table 1: Elasticity Estimates 1970-1990

	OLS
Log Price	-0.809 (0.038)
N	1071
R2	0.29

The regression in Table 1 shows that cigarette demand has an elasticity of -0.809 , which is inelastic, suggesting that cigarette demand is less responsive to changes in price.

### 2.2 Question 2

Table 2: Elasticity Estimates 1970-1990

	IV
Log Price	-0.736 (0.075)
N	1071
R2	0.29

The IV regression in Table 2 shows that cigarette demand has a price elasticity of -0.736 which is inelastic. However, it is more inelastic compared to the previous regression without an instrument, suggesting that demand is even less responsive to price changes.

### 2.3 Question 3

Table 3: First Stage and Reduced Form Estimates 1970-1990

	First Stage	Reduced Form
Log Tax	0.327 (0.017)	-0.241 (0.028)
N	1071	1071
R2	0.26	0.06

### 2.4 Question 4

Table 4: Elasticity Estimates 1991-2015

	OLS	IV
Log Price	-0.997 (0.025)	-1.164 (0.029)
N	1275	1275
R2	0.56	0.55

Table 5: First Stage and Reduced Form Estimates 1991-2015

	First Stage	Reduced Form
Log Tax	0.308 (0.005)	-0.358 (0.008)
N	1275	1275
R2	0.76	0.58

### 2.5 Question 5

The results from all the ATE questions are presented in Table 6 and Table 7. The results from regression of log sales on log prices from 1991-2015 show an elasticity of -0.997 which is more elastic compared to the results from 1970-1990. The IV regression for 1991-2015 show an elasticity of -1.164 which is elastic. These results indicate that the overall demand for cigarettes have become more elastic in 1991 to 2015 compared to in 1970-1990, indicating a greater responsiveness in quantity demanded due to a change in price.

Table 6: Elasticity Estimates

	1970 - 1990		1991 - 2015	
	OLS	IV	OLS	IV
Log Price	-0.809 (0.038)	-0.736 (0.075)	-0.997 (0.025)	-1.164 (0.029)
N	1071	1071	1275	1275
R2	0.29	0.29	0.56	0.55

Table 7: First Stage and Reduced Form Estimates

	1970 - 1990		1991 - 2015	
	First Stage	Reduced Form	First Stage	Reduced Form
Log Tax	0.327 (0.017)	-0.241 (0.028)	0.308 (0.005)	-0.358 (0.008)
N	1071	1071	1275	1275
R2	0.26	0.06	0.76	0.58