Homework 3 - Research in Health Economics

Ammarah Ahmed

1 Summarise the Data

1.1 Question 1

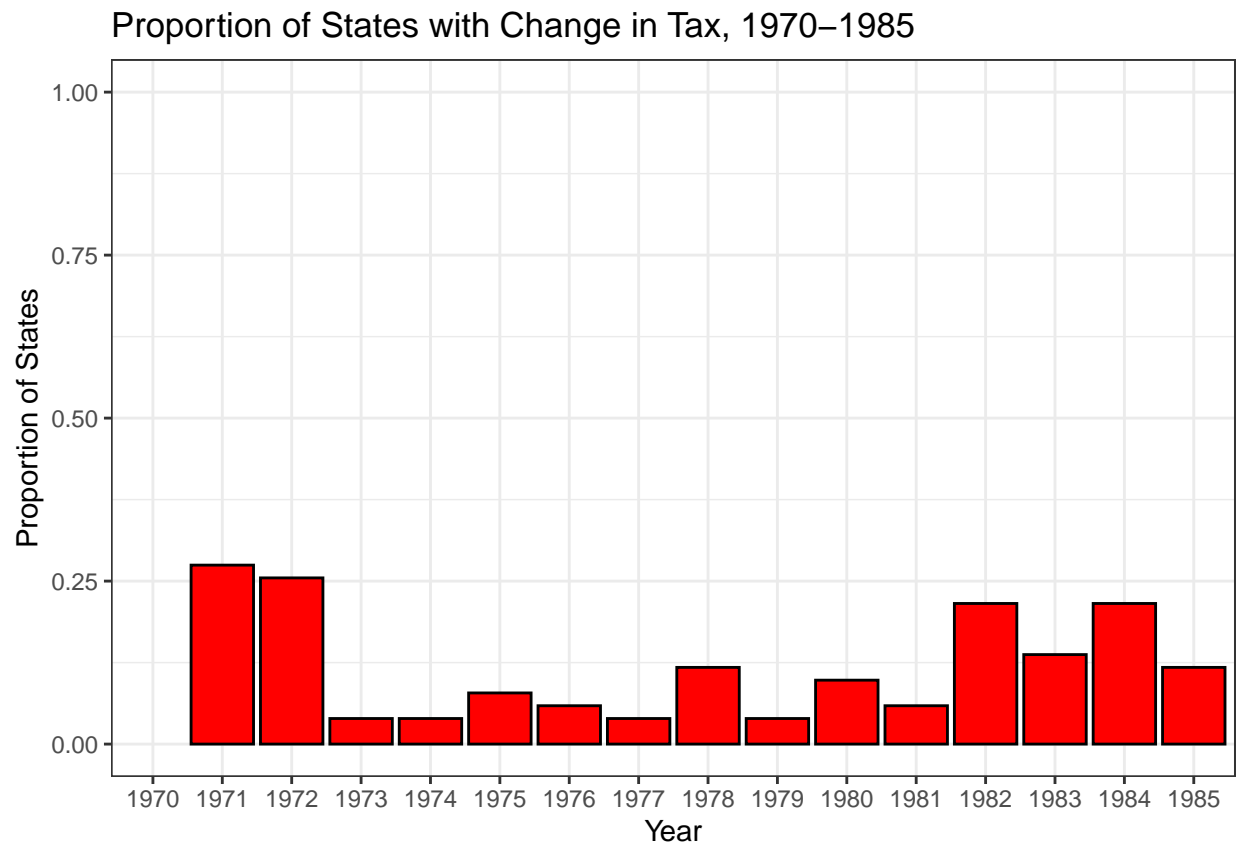**Proportion of States with Change in Tax, 1970–1985**

Figure 1: Proportion of States with Change in Tax, 1970-1985

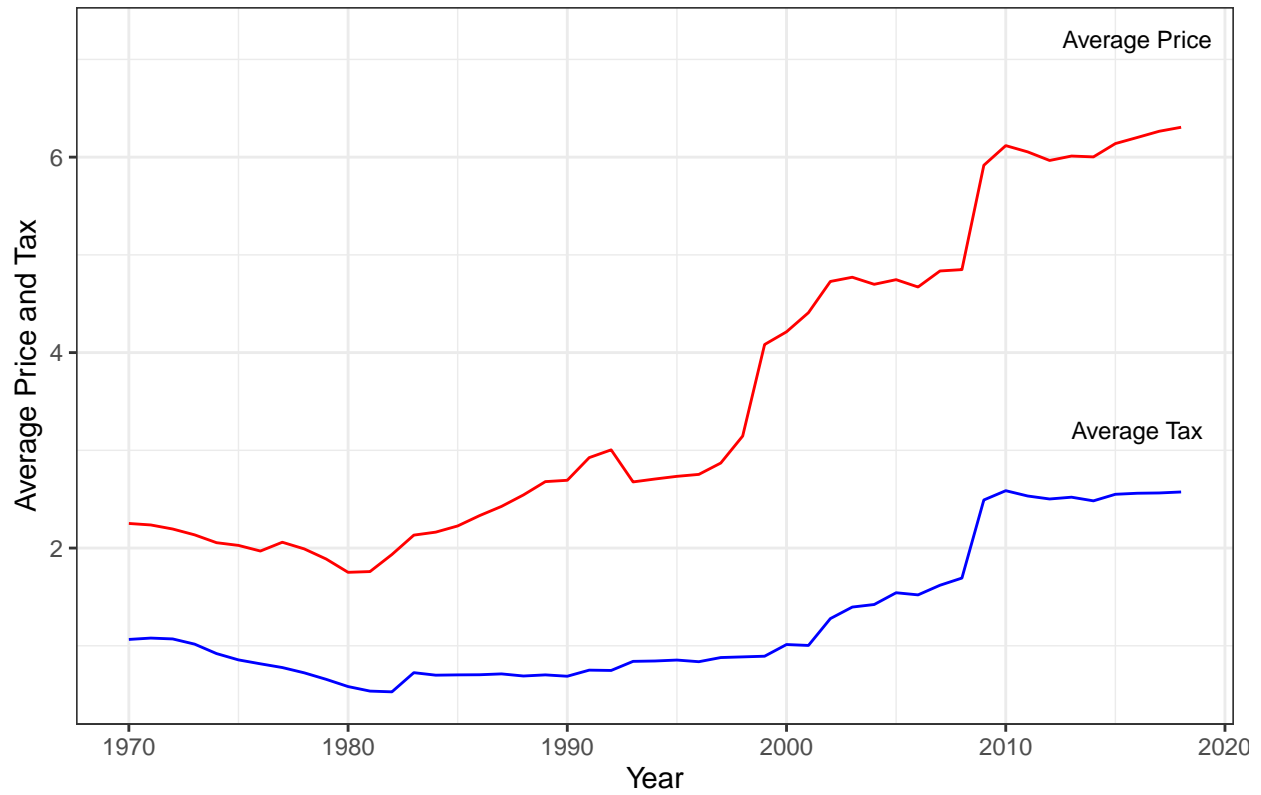## 1.2 Question 2

Average Price and Tax from 1970–2018

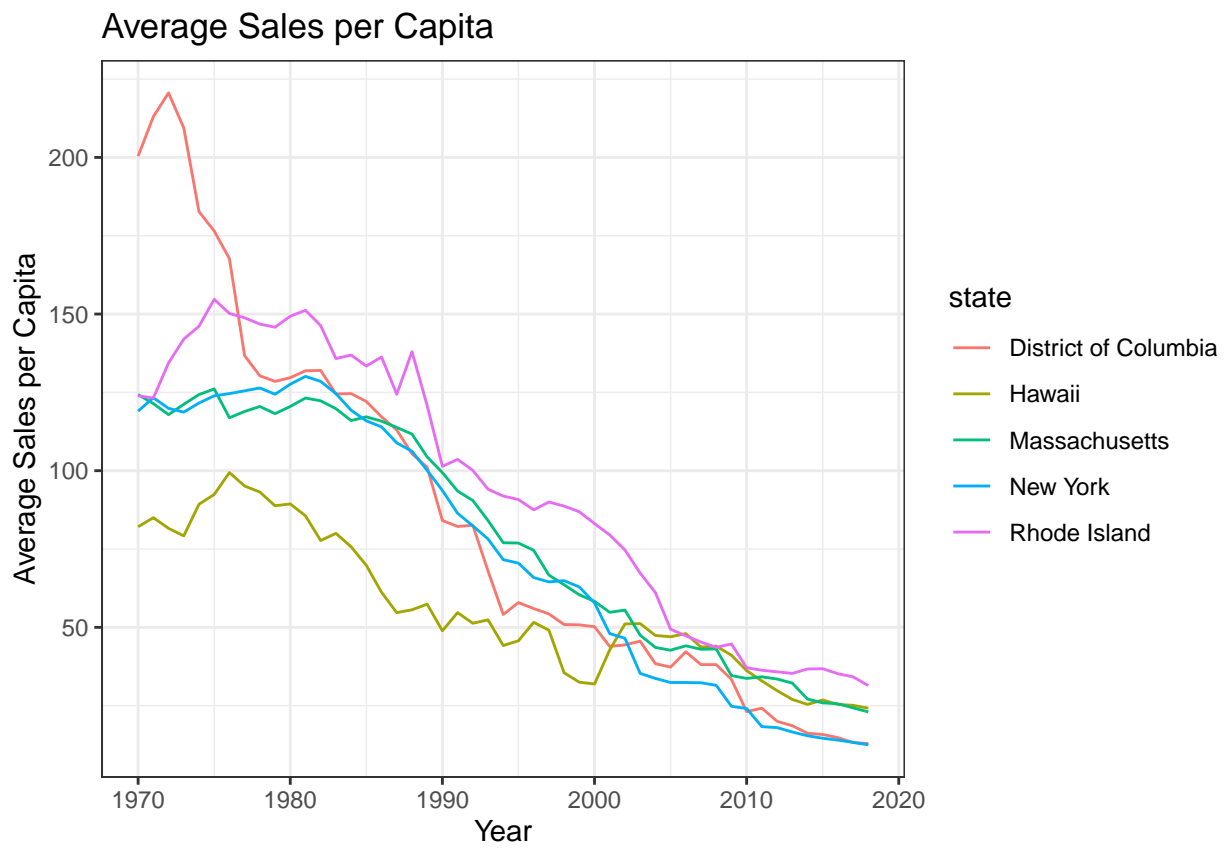Figure 2: Average Price and Tax

1.3   Question 3

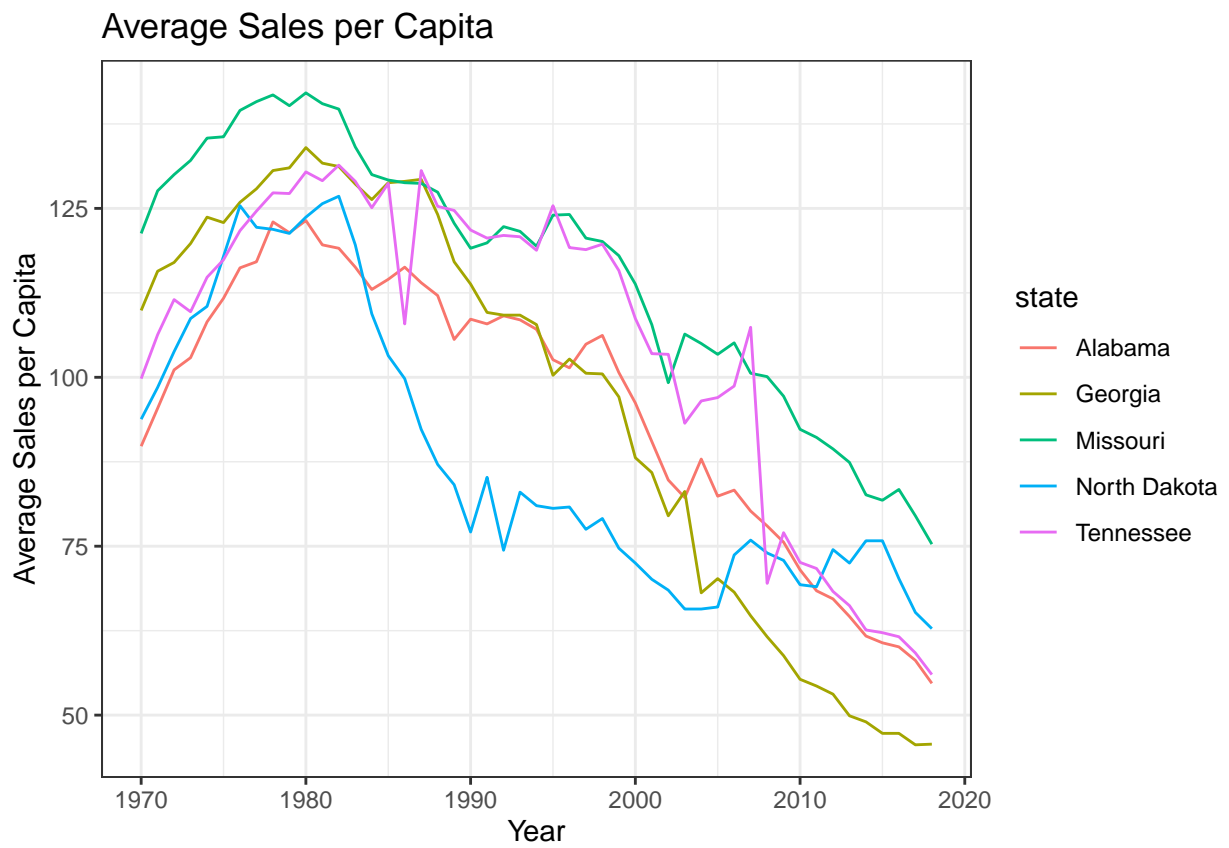Figure 3: Average Sales per Capita for States with Highest Price Increase

1.4   Question 4

Average Sales per Capita

Figure 4: Average Sales per Capita for States with Lowest Price Increase

1.5 Question 5

Average Sales in States with Highest and Lowest Price Increase
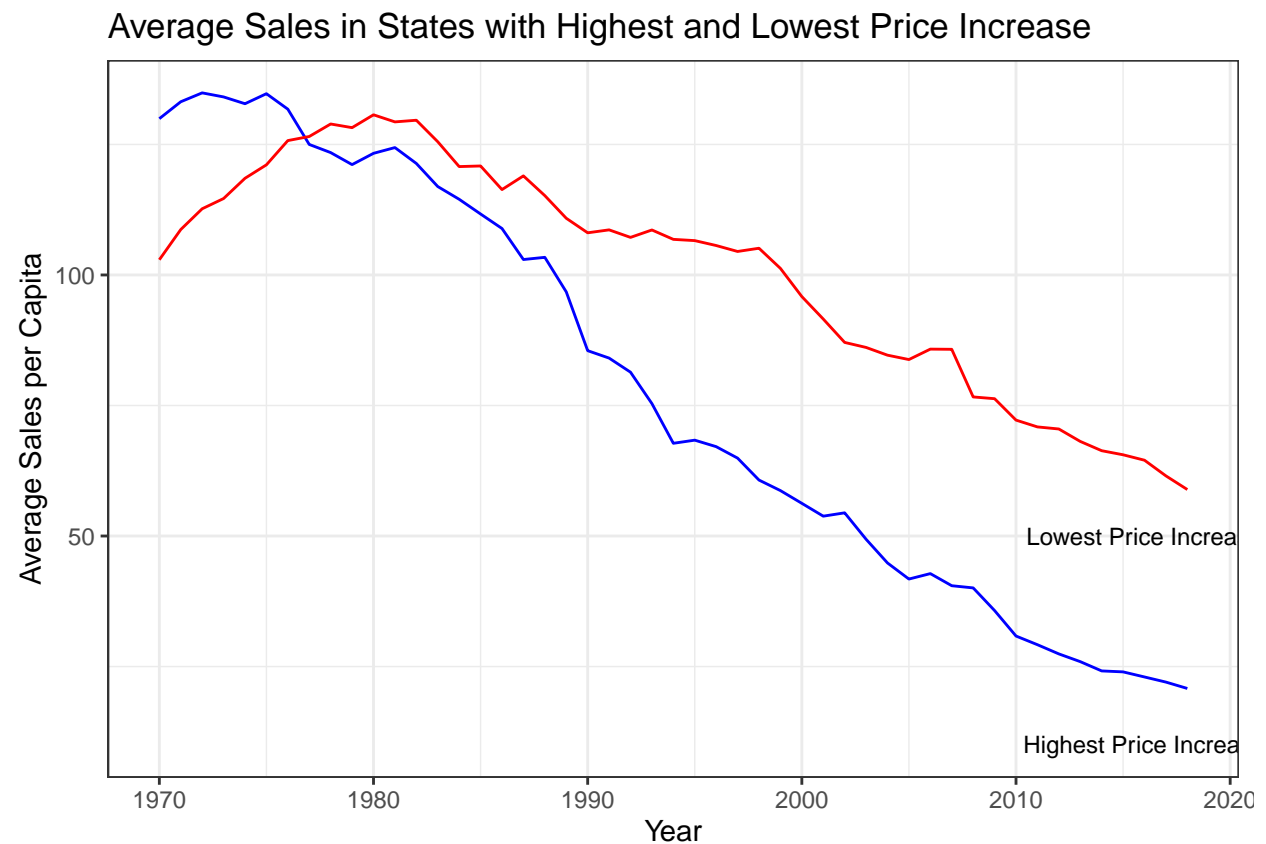
Figure 5: Average Sales in States with Highest and Lowest Price Increase

A graph showing the average sale of cigarettes in the 5 with states with highest and lowest price change is shown in Figure 5. It shows the states with the highest change in price had a more drastic fall in average sales between 1970 and 2018 compared to the states with the lowest change in price. 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.

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 inelestic, 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. While the elasticity estimates in the OLS and IV regression are not very different, there is a difference which could be due to either the OLS or IV estimate being biased. OLS could be biased due to omitted variable bias while IV could be biased due to the violation of exclusion restriction or finite sample size. Also, the OLS estimates are a result of variations across all the variables while IV estimates are a result of variation in the instrument i.e tax prices which does not vary as much in this time period as shown in 2.

2.3 Question 3

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

	First Stage	Reduced Form
Log Tax	0.327	−0.241
	(0.017)	(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	−1.164
	(0.025)	(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	−0.358
	(0.005)	(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 1991-2015 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	−0.736	−0.997	−1.164
	(0.038)	(0.075)	(0.025)	(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	−0.241	0.308	−0.358
	(0.017)	(0.028)	(0.005)	(0.008)
N	1071	1071	1275	1275
R2	0.26	0.06	0.76	0.58