Joseph-J-hwk3-1

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

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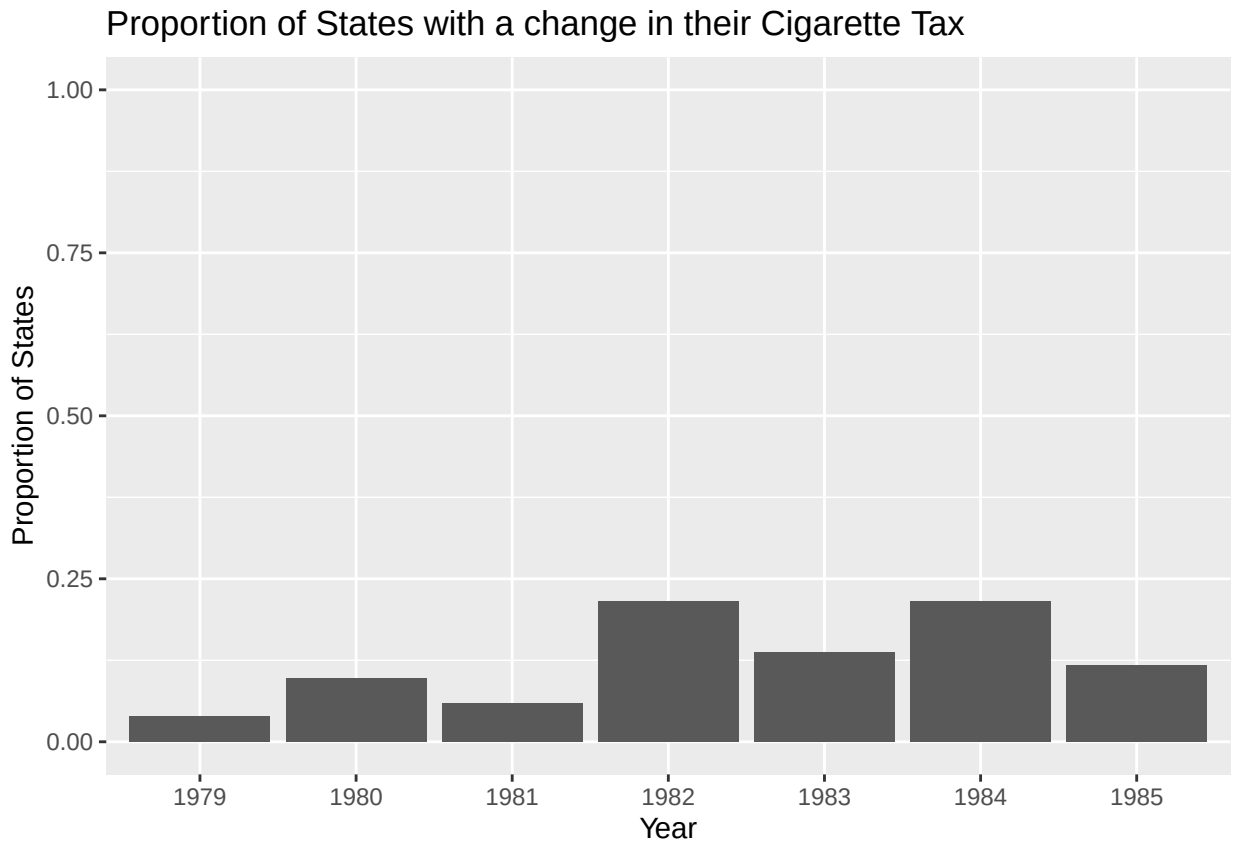
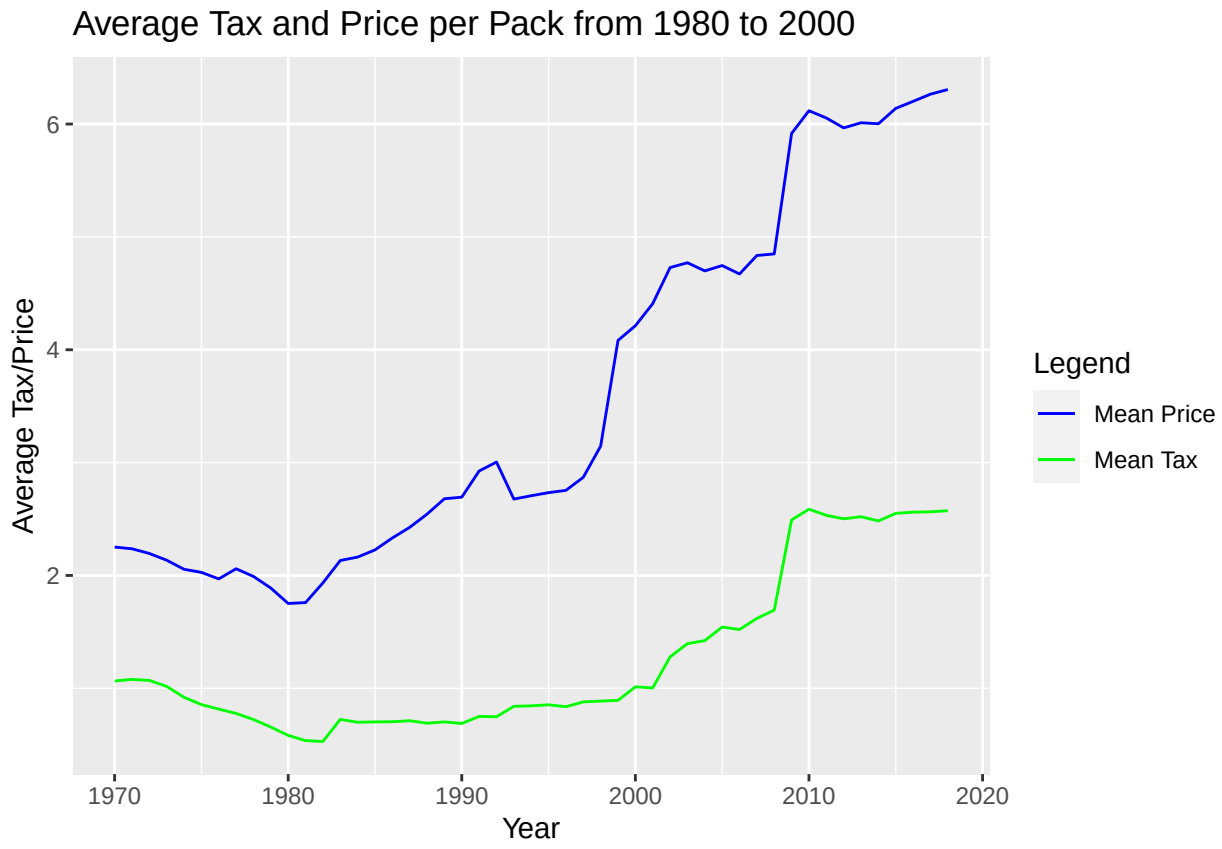


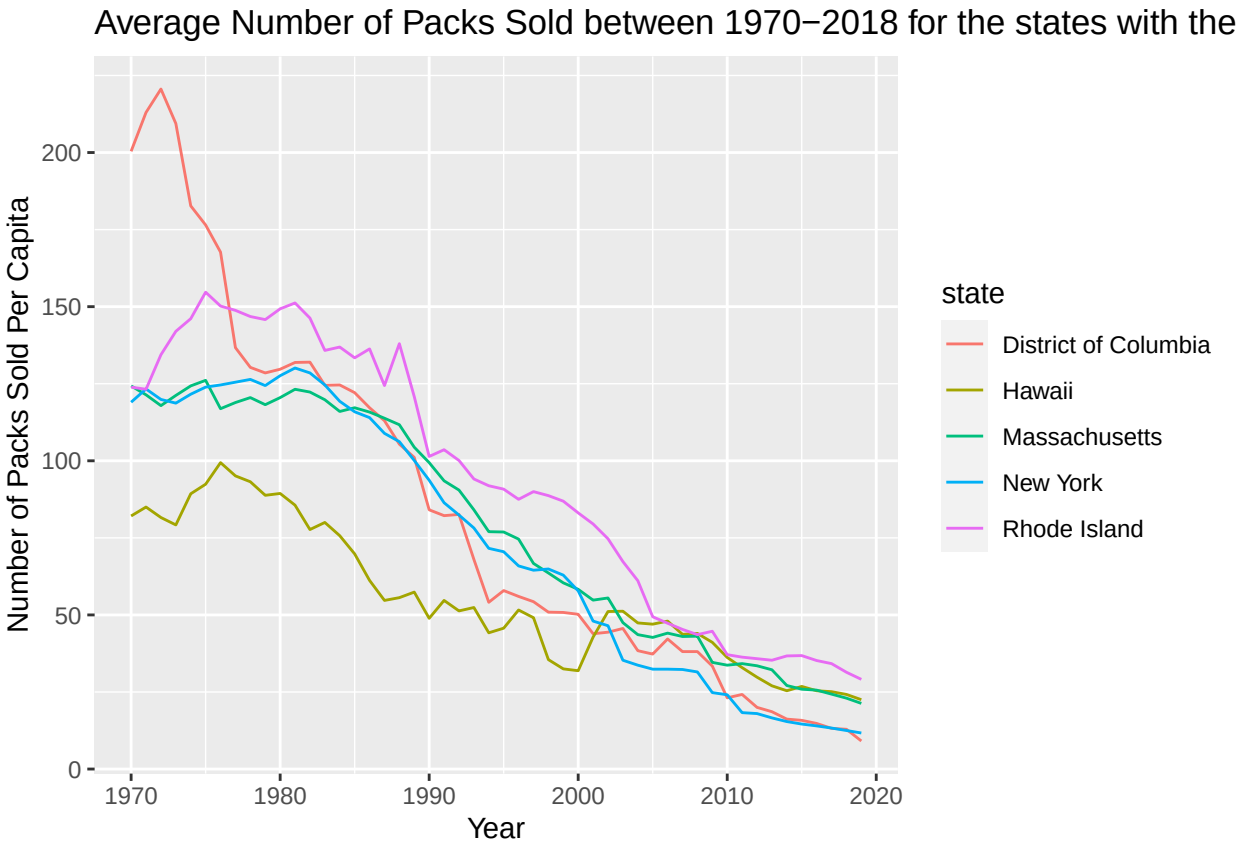
Figure 1: Share of States with a Change in Cigarette Taxes by Year

0.0.2 2. Average tax on cigarettes and the average price of a pack of cigarettes from 1970 to 2018.



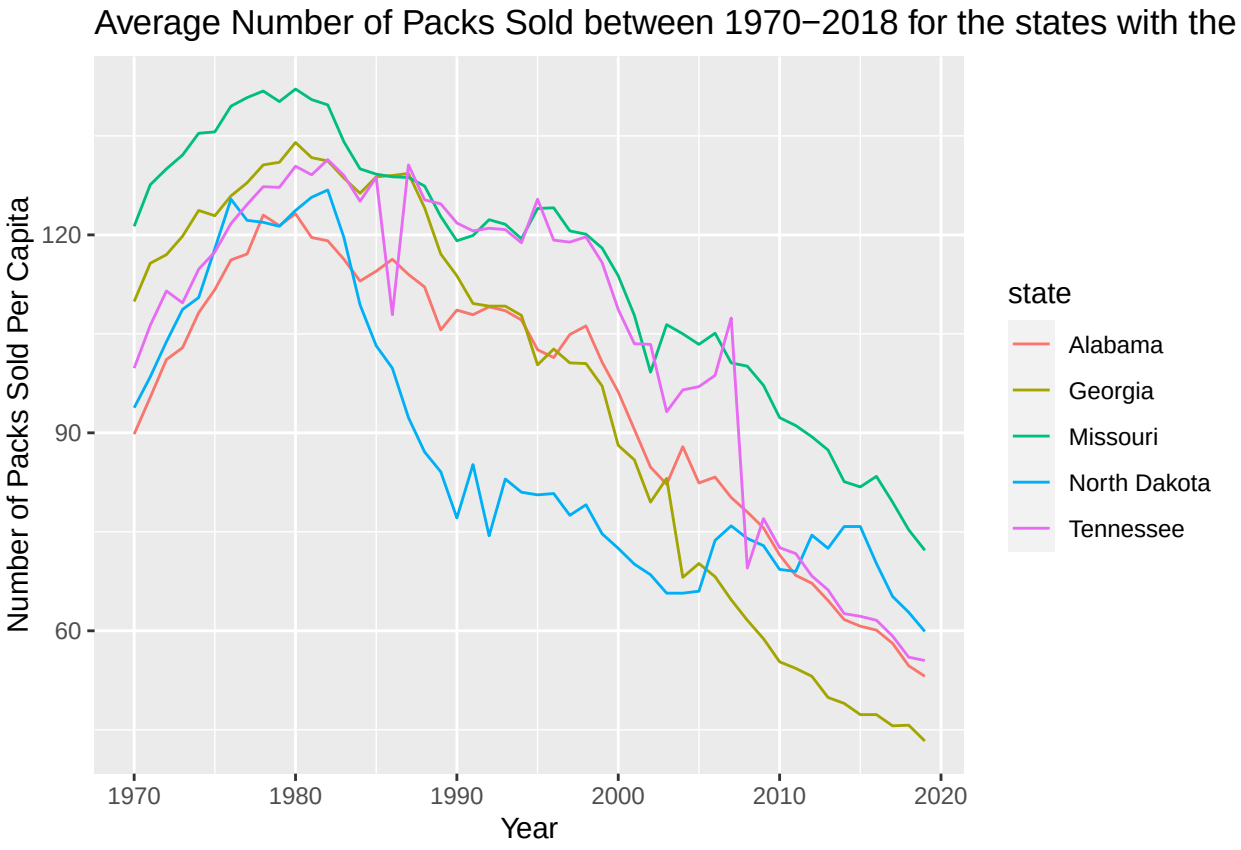
0.0.3 3. Top 5 States with highest increases in cigarette prices. Plot the average number of packs sold per capita for those states from 1970 to 2018.

state	change_in_price
District of Columbia	7.090193
New York	6.993679
Rhode Island	6.397551
Hawaii	6.348514
Massachusetts	6.347500

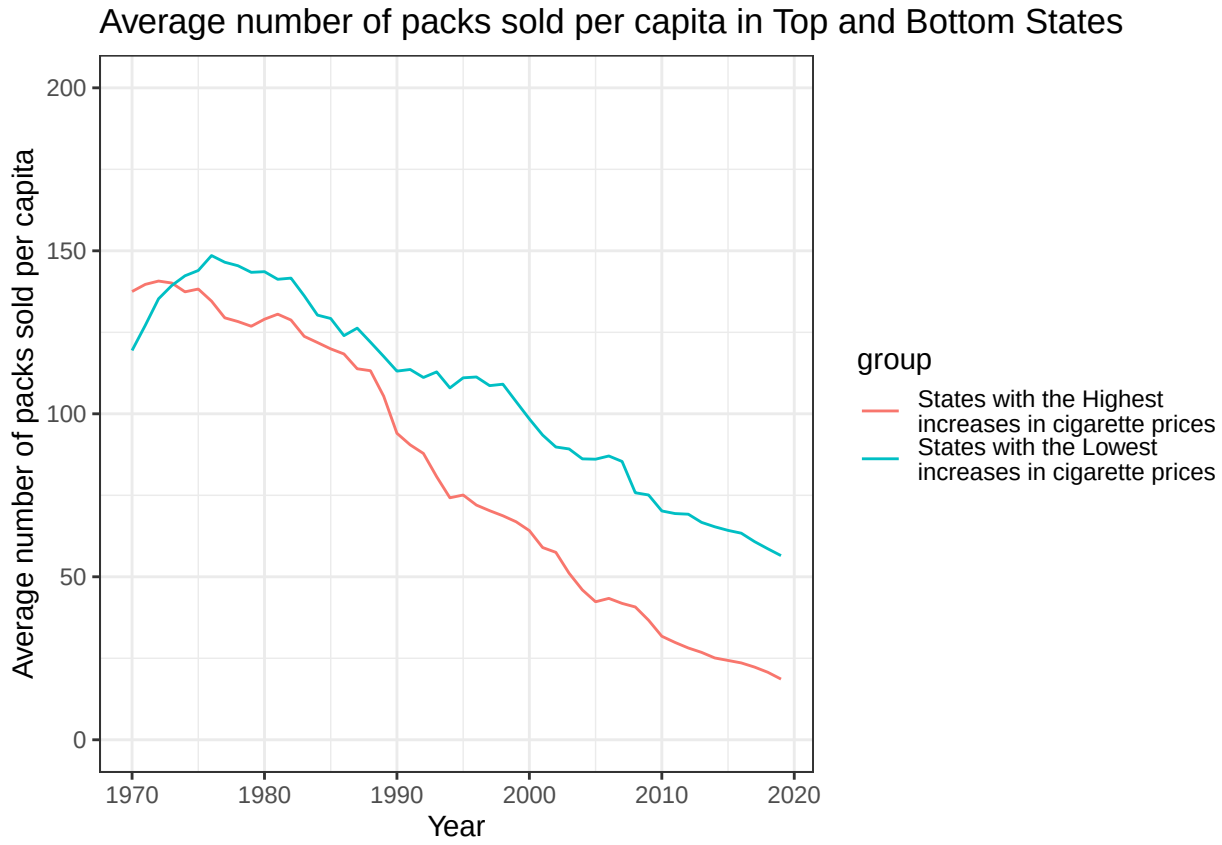


0.0.4 4. Top 5 States with lowest increases in cigarette prices. Plot the average number of packs sold per capita for those states from 1970 to 2018.

state	change_in_price
Missouri	2.355218
Tennessee	2.368524
North Dakota	2.486131
Alabama	2.549429
Georgia	2.664879



0.0.5 5. Compare Trends



For the states with the highest increase in cigarette prices they had a much higher decrease in the number of packs sold per captia where the highest number of packs sold per caption was approximately close to 140 in 1970 and decrease to a little less than 25 pack per captia. In comparison for the states with the smallest/lowest change in cigarette prices the change in number of packs sold was less pronounced. Specifically there was actually a small increase between 1970 and 1975 where the highest number of packs per captia was 150 in 1975 and decrease to a little more than 50 by 2018.

	(1)
(Intercept)	5.427
	(0.030)
ln_price_2012	−0.809
	(0.038)
Num.Obs.	1071
R2	0.294
R2 Adj.	0.293
AIC	−522.8
BIC	−512.8
RMSE	0.19
Std.Errors	IID

0.0.6 6. From 1970 to 1990, regress log sales on log prices to estimate the price elasticity of demand over that period.

For every 1% increase in cost per pack the sales per captia decrease by .809%. Thus demands decreases as there is an icnrease in costs per pack.

	(1)
(Intercept)	5.372
	(0.057)
fit_ln_price_2012	−0.736
	(0.075)
Num.Obs.	1071
R2	0.292
R2 Adj.	0.291
AIC	−519.1
BIC	−509.2
RMSE	0.19
Std.Errors	IID

0.0.7 7. From 1970 to 1990, regress log sales on log prices to estimate the price elasticity of demand over that period using the total (federal and state) cigarette tax (in dollars) as an instrument for log prices

For every 1% increase in cost per pack the sales per captia decrease by .736%. Thus demands decreases as there is an increase in costs per pack. This is different from the first model because we are using total dollars as the instrument variable to complete the regression. the original estimate the predictor variable (cost per pack) can be correlated to other variables beyond sales per capita.Thus by using the IV tax dollar we are having a more accurate estimate because we are reducing endogeneity

	(1)
(Intercept)	0.508
	(0.014)
total_tax_cpi_2012	0.327
	(0.017)
Num.Obs.	1071
R2	0.262
R2 Adj.	0.261
AIC	−1333.0
BIC	−1323.1
RMSE	0.13
Std.Errors	IID

	(1)
(Intercept)	4.998
	(0.023)
total_tax_cpi_2012	−0.241
	(0.028)
Num.Obs.	1071
R2	0.064
R2 Adj.	0.063
AIC	−220.3
BIC	−210.4
RMSE	0.22
Std.Errors	IID

0.0.8 8. The first stage and reduced-form results from the instrument.

0.0.9 9.

	(1)
(Intercept)	5.660
	(0.036)
ln_price_2012	−0.997
	(0.025)
Num.Obs.	1275
R2	0.561
R2 Adj.	0.561
AIC	516.0
BIC	526.3
RMSE	0.30
Std.Errors	IID

	(1)
(Intercept)	5.899
	(0.042)
fit_ln_price_2012	−1.164
	(0.029)
Num.Obs.	1275
R2	0.546
R2 Adj.	0.545
AIC	560.9
BIC	571.2
RMSE	0.30
Std.Errors	IID

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For every 1% increase in cost per pack the sales per captia decrease by .997%. Thus demands decreases as there is an increase in costs per pack.

Given using the instrument variable of tax dollars, For every 1% increase in cost per pack the sales per captia decrease by 1.16%. Thus demands decreases even more as there is an increase in costs per pack.

	(1)
(Intercept)	0.971
	(0.009)
total_tax_cpi_2012	0.308
	(0.005)
Num.Obs.	1275
R2	0.764
R2 Adj.	0.764
AIC	−1003.9
BIC	−993.5
RMSE	0.16
Std.Errors	IID

	(1)
(Intercept)	4.769
	(0.015)
total_tax_cpi_2012	−0.358
	(0.008)
Num.Obs.	1275
R2	0.585
R2 Adj.	0.584
AIC	446.5
BIC	456.8
RMSE	0.29
Std.Errors	IID

0.0.10 10. Compare estimates between 1970-1990 versus 1991-2015

Table 3: Point 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

The estimates of elasticity in the period of 1991-2015 compared to the earlier time period of 1970-1990 are much more pronounced and greater. The reason that sales of cigarettes have a greater effect by a change in price is because during this time their of may have been greater awareness of the risks smoking causes to one's health and thus people were more sensitive to increases in prices and made them buy less cigarettes in total.