

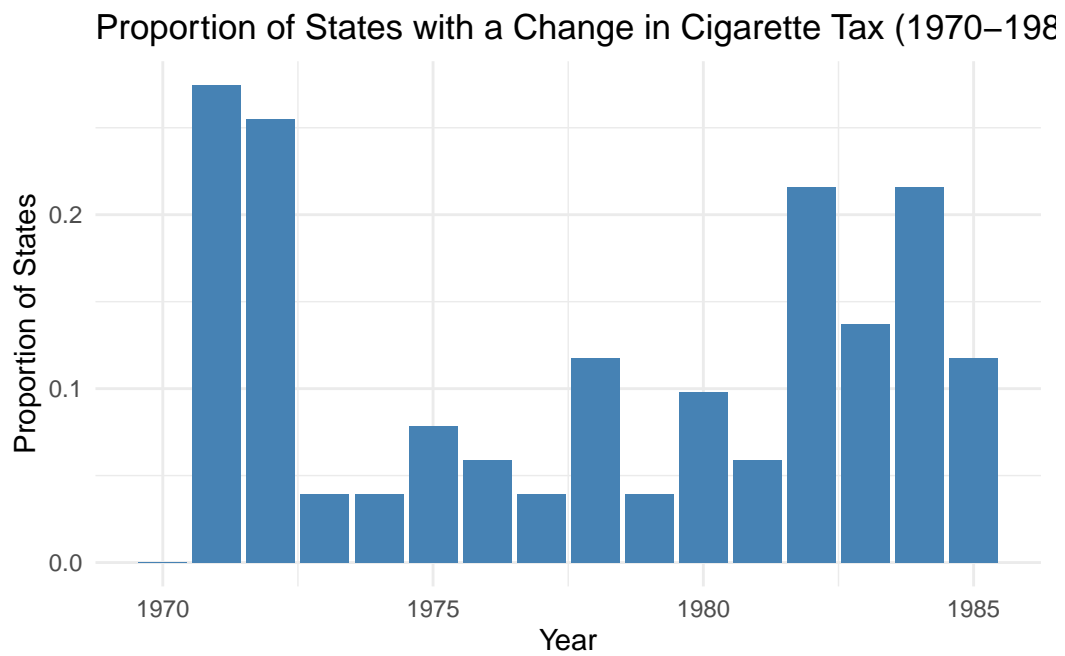
Homework 3

ECON 470, Spring 2025

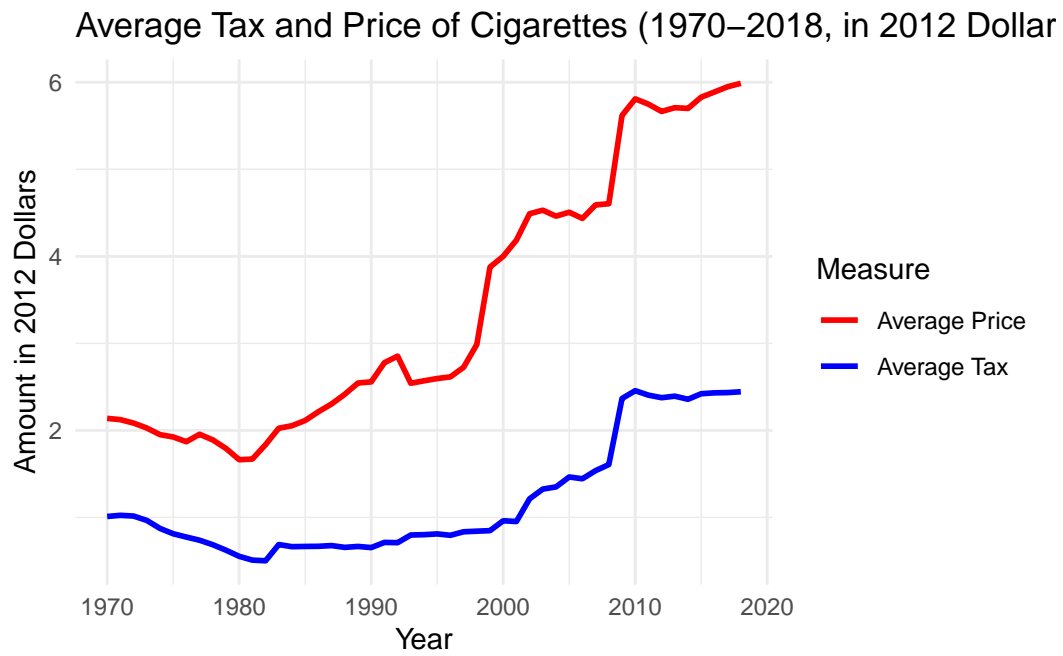
Ethan Murakami

Here is a link to my repository: {<https://github.com/bemur3/hmwk3>}

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

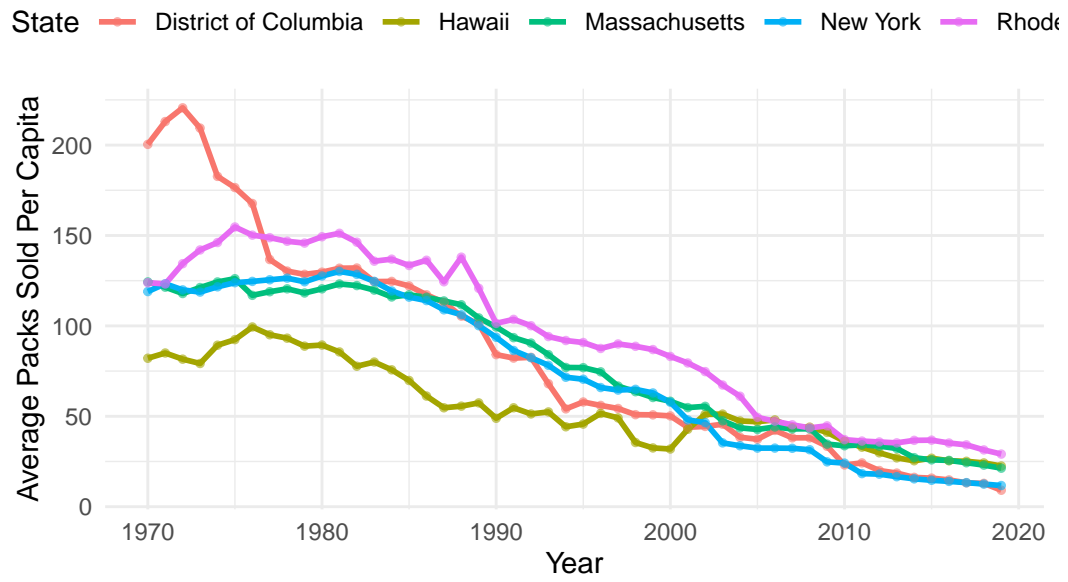


2.



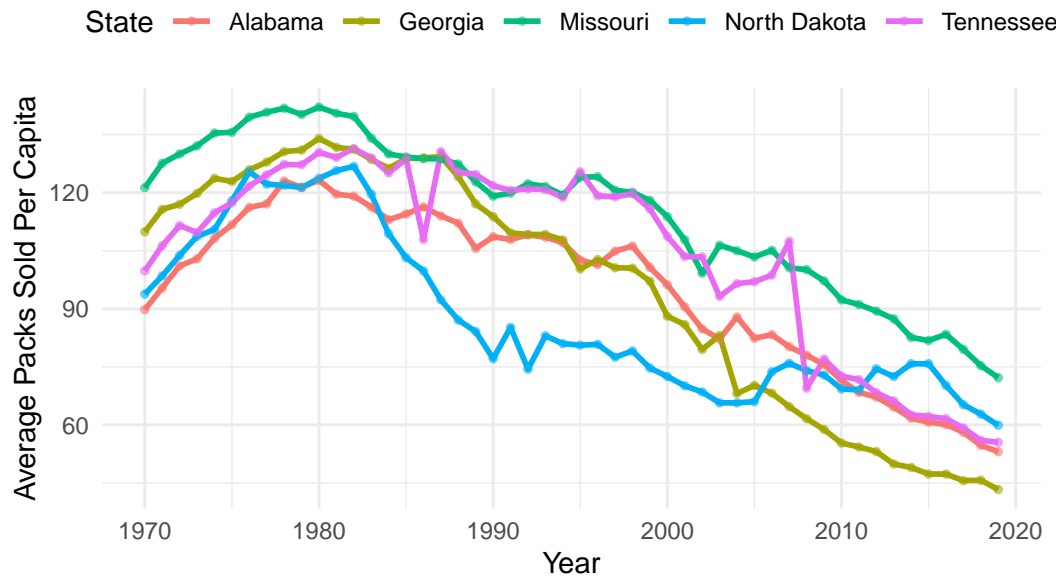
3.

Average Packs Sold Per Capita (Top 5 States with Highest Price)



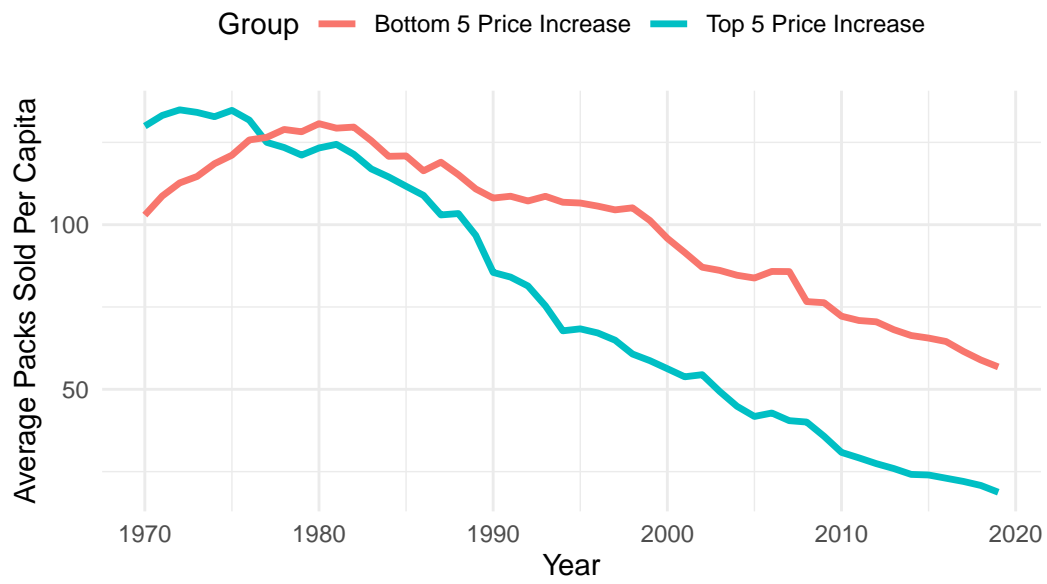
4.

Average Packs Sold Per Capita (Bottom 5 States with Lowest I



5.

Cigarette Sales in States with High vs. Low Price Increases (1970-2020)



6.

OLS estimation, Dep. Var.: log_sales

Observations: 1,071

Standard-errors: IID

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	5.385438	0.027804	193.6917	< 2.2e-16 ***
log_price	-0.809438	0.038366	-21.0980	< 2.2e-16 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

RMSE: 0.189214 Adj. R2: 0.293322

7.

TSLS estimation - Dep. Var.: log_sales

Endo. : log_price

Instr. : log_tax

Second stage: Dep. Var.: log_sales

Observations: 1,071

Standard-errors: IID

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	5.465991	0.035234	155.1349	< 2.2e-16 ***
fit_log_price	-0.923078	0.049025	-18.8286	< 2.2e-16 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

RMSE: 0.189989 Adj. R2: 0.287523

F-test (1st stage), log_price: stat = 1,725.3, p < 2.2e-16 , on 1 and 1,069 DoF.

Wu-Hausman: stat = 14.3, p = 1.614e-4, on 1 and 1,068 DoF.

8.

OLS estimation, Dep. Var.: log_price

Observations: 1,071

Standard-errors: IID

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	1.181922	0.011741	100.6631	< 2.2e-16 ***
log_tax	0.332789	0.008012	41.5369	< 2.2e-16 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

RMSE: 0.093299 Adj. R2: 0.617079

OLS estimation, Dep. Var.: log_sales

Observations: 1,071

Standard-errors: IID

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	4.374985	0.024770	176.6270	< 2.2e-16 ***
log_tax	-0.307190	0.016902	-18.1749	< 2.2e-16 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

RMSE: 0.196823 Adj. R2: 0.235346

9.

OLS estimation, Dep. Var.: log_sales_b

Observations: 1,275

Standard-errors: IID

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	5.608303	0.035140	159.6000	< 2.2e-16 ***
log_price_b	-0.996814	0.024692	-40.3697	< 2.2e-16 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

RMSE: 0.295775 Adj. R2: 0.561101

TSLS estimation - Dep. Var.: log_sales_b

Endo. : log_price_b

Instr. : log_tax_b

Second stage: Dep. Var.: log_sales_b

Observations: 1,275

Standard-errors: IID

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	5.76890	0.037898	152.2221	< 2.2e-16 ***
fit_log_price_b	-1.11294	0.026728	-41.6390	< 2.2e-16 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

RMSE: 0.298334 Adj. R2: 0.553474

F-test (1st stage), log_price_b: stat = 8,390.2, p < 2.2e-16, on 1 and 1,273 DoF.

Wu-Hausman: stat = 164.5, p < 2.2e-16, on 1 and 1,272 DoF.

OLS estimation, Dep. Var.: log_price_b

Observations: 1,275

Standard-errors: IID

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	1.376565	0.003416	402.9731	< 2.2e-16 ***
log_tax_b	0.431717	0.004713	91.5978	< 2.2e-16 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

RMSE: 0.121855 Adj. R2: 0.868159

OLS estimation, Dep. Var.: log_sales_b

Observations: 1,275

Standard-errors: IID

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	4.236866	0.007842	540.2558	< 2.2e-16 ***

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log_tax_b    -0.480477    0.010820 -44.4052 < 2.2e-16 ***
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Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
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RMSE: 0.279749    Adj. R2: 0.607374
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10.

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# A tibble: 2 x 3
  Period    OLS_Elasticity IV_Elasticity
  <chr>          <dbl>          <dbl>
1 1970-1990    -0.809           NA
2 1991-2015    -0.997           NA
```