Cigarettes In the United States

	state	year	cpi	pop	packpc	income	tax	avgprs	taxs
1	AL	1985	1.076	3973000	116.48628	46014968	32.50000	102.18167	33.34834
2	AR	1985	1.076	2327000	128.53459	26210736	37.00000	101.47500	37.00000
3	AZ	1985	1.076	3184000	104.52261	43956936	31.00000	108.57875	36.17042
4	CA	1985	1.076	26444000	100.36304	447102816	26.00000	107.83734	32.10400
5	CO	1985	1.076	3209000	112.96354	49466672	31.00000	94.26666	31.00000
6	CT	1985	1.076	3201000	109.27835	60063368	42.00000	128.02499	51.48333
7	DE	1985	1.076	618000	143.85114	9927301	30.00000	102.49166	30.00000
8	FL	1985	1.076	11352000	122.18112	166919248	37.00000	115.29000	42.49000
9	GA	1985	1.076	5963000	127.23462	78364336	28.00000	97.02517	28.84183
10	IA	1985	1.076	2830000	113.74558	37902896	34.00000	101.84200	37.91700
11	ID	1985	1.076	994000	103.01811	11577261	25.10000	102.89933	29.05767
12	IL	1985	1.076	11401000	123.20848	176786352	28.00001	104.44025	28.91526
13	IN	1985	1.076	5460000	137.63737	71751616	26.50000	96.18000	31.08000
14	KS	1985	1.076	2428000	116.68040	34784360	32.00000	98.92291	34.88125
15	KY	1985	1.076	3695000	186.03519	42703144	19.00000	87.00125	23.14292
16	LA	1985	1.076	4409000	127.55727	53431900	32.00000	108.39400	36.16900
17	MA	1985	1.076	5881000	115.67760	98328688	42.00000	112.20834	42.00000
18	MD	1985	1.076	4414000	120.97871	74851664	29.00000	91.96667	29.00000
19	ME	1985	1.076	1163000	128.11694	14575292	36.00000	107.04750	41.09750
20	MI	1985	1.076	9077000	128.00485	133728040	37.00000	104.91417	37.83083
21	MN	1985	1.076	4185000	112.90323	63152360	34.00000	113.64967	40.43300
22	MO	1985	1.076	5001000	130.37393	69341920	29.00000	99.33817	29.85484
23	MS	1985	1.076	2588000	117.04018	25678534	27.58333	105.29333	33.54333
24	MT	1985	1.076	822000	104.25790	9785230	32.00000	99.29166	32.00000

Showing 1 to 25 of 528 entries, 9 total columns

The Cigarette Consumption Panel Data Set

a panel of 48 observations from 1985 to 1995

number of observations : 528

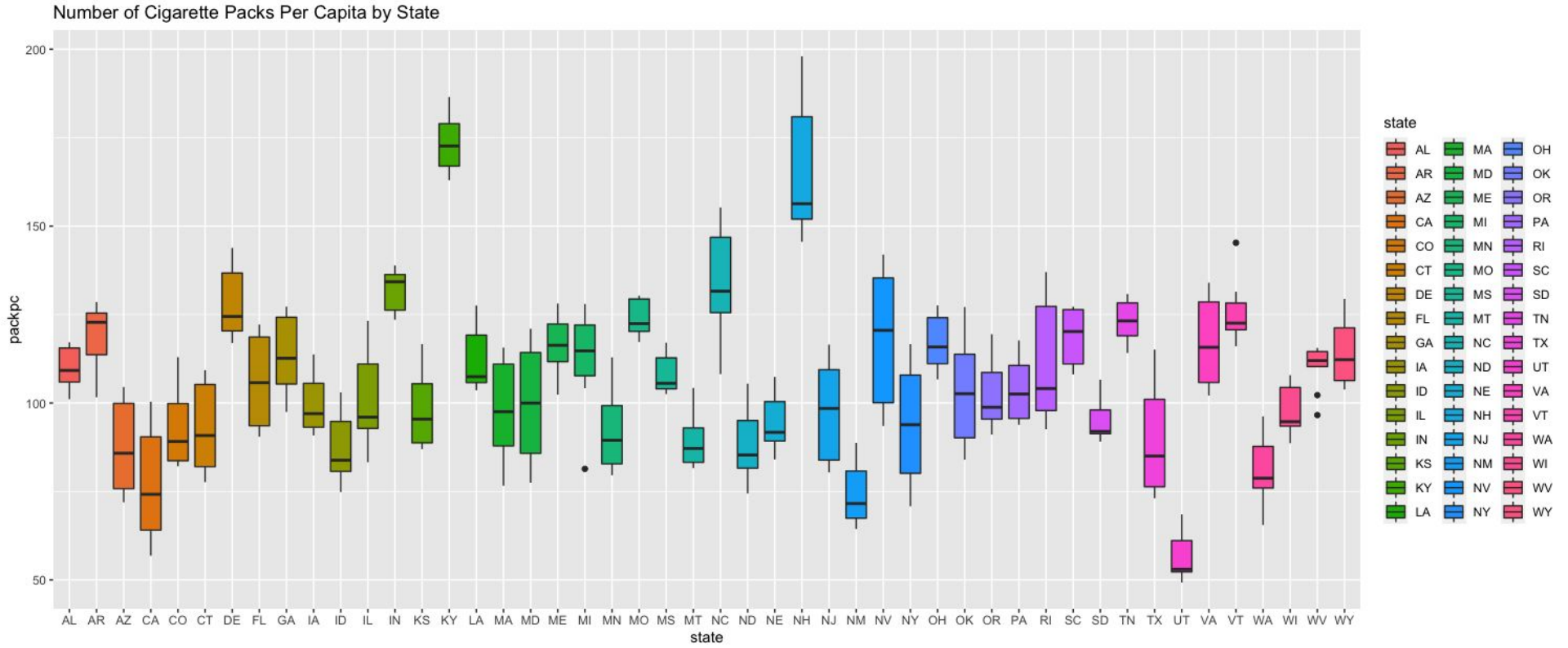
observation : regional

country : United States

Source: *Professor Jonathan Gruber, MIT.*

References

Stock, James H. and Mark W. Watson (2003) Introduction to Econometrics, Addison-Wesley Educational Publishers, chapter 10.



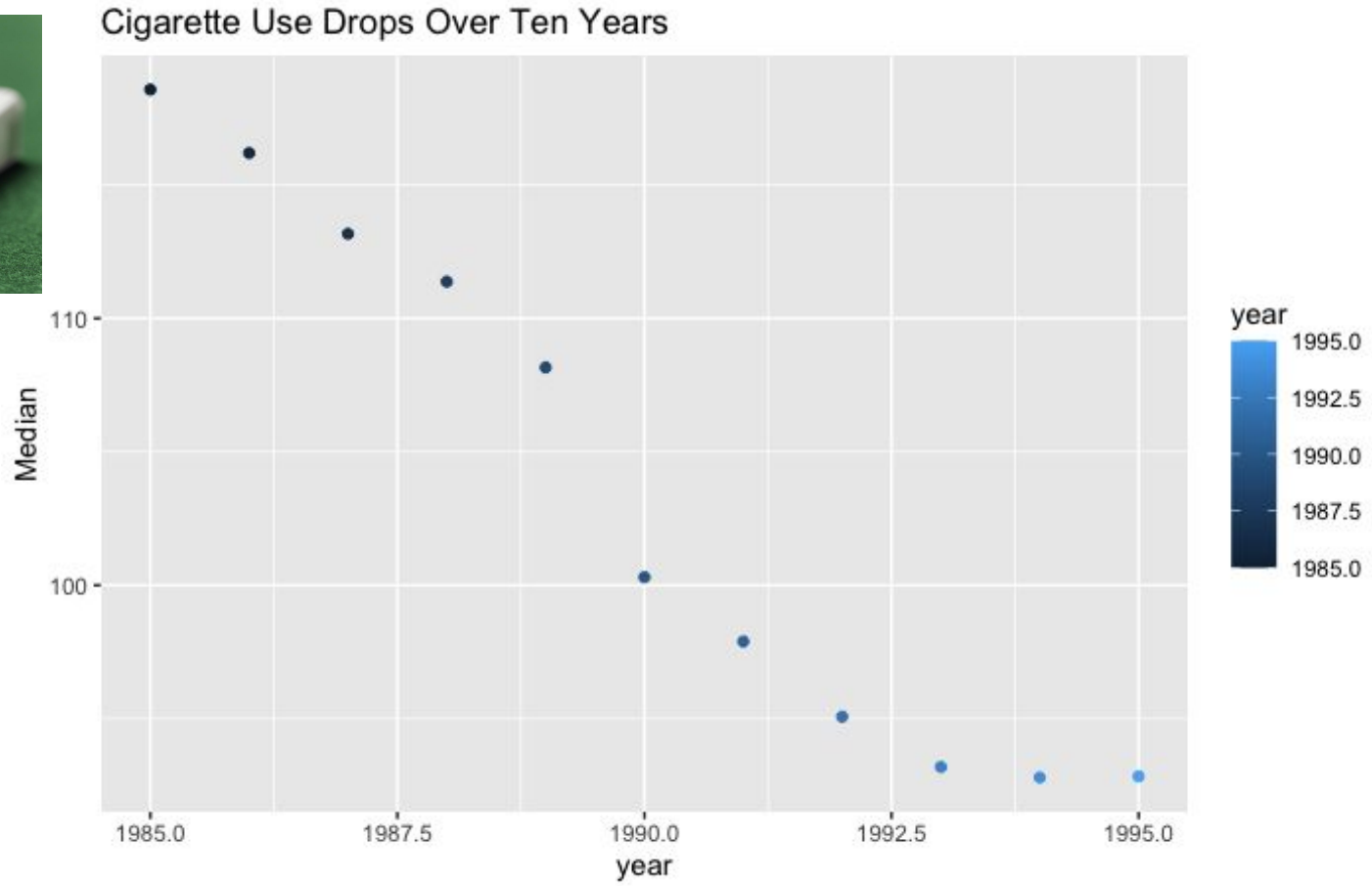

```
ggplot(Cigarette, aes(x = state, y = packpc, fill = state)) + geom_boxplot() + ggtitle("Number of Cigarette Packs Per Capita by State")
```

Average # of cigarette packs per capita by state

Average overall	3 States with Highest	3 States with Lowest
106	KY 174 NH 166 NC 135	UT 57 NM 74 CA 77

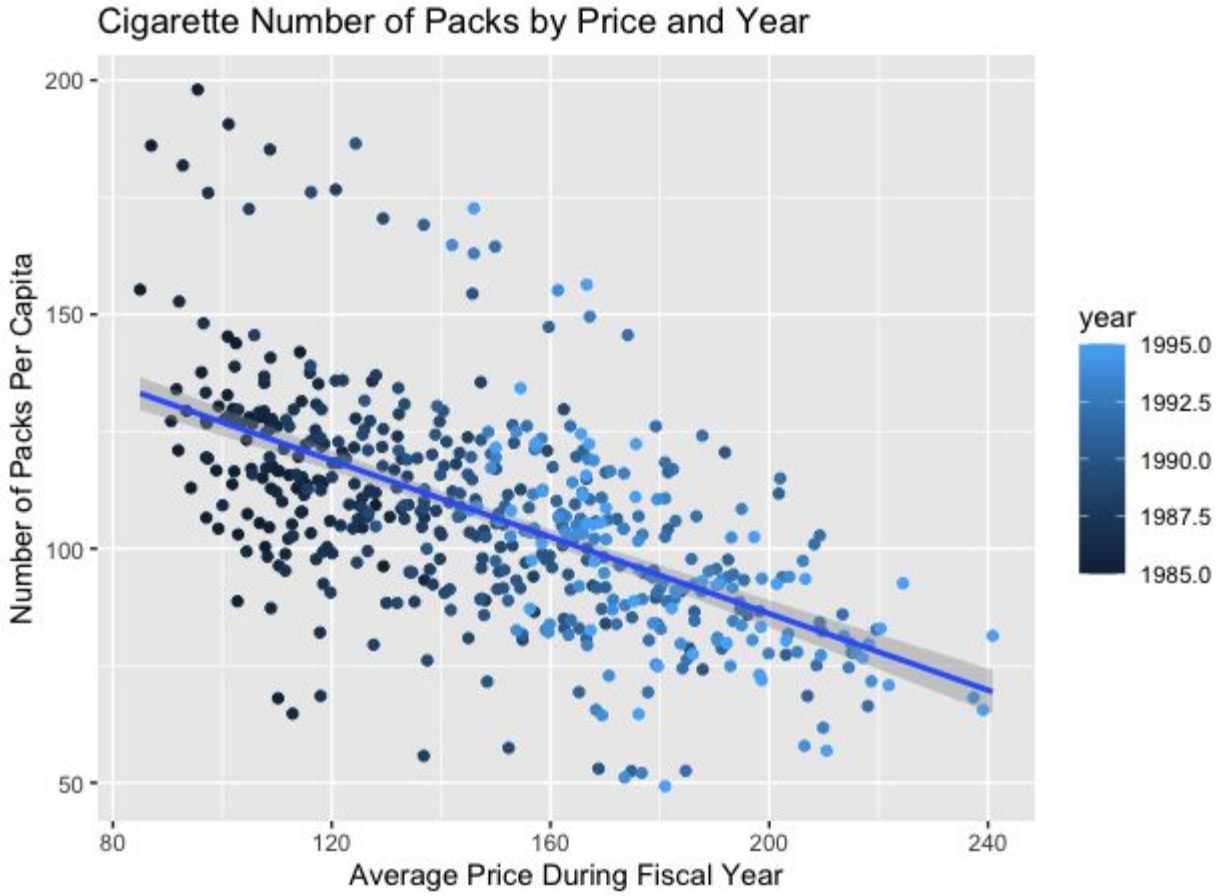
```
mean(Cigarette$packpc)

StateMean <- Cigarette %>% group_by(state) %>% summarise(Mean = mean(packpc)) %>% arrange((Mean))
View(StateMean)
```

```
ggplot(StateMedian,
aes(x = year, y =
Median, col = year)) +
geom_point() +
ggtitle("Cigarette Use
Drops Over Ten
Years")
```



AS PRICE INCREASES, USE GOES DOWN

Negatively correlated.
Price does seem to affect overall use.




```
ggplot(Cigarette, aes(x = avgprs, y = packpc, color = year)) + geom_point() + geom_smooth(method = lm) +ggtitle("Cigarette Number of Packs by Price and Year") + xlab("Average Price During Fiscal Year") + ylab("Number of Packs Per Capita")
```

The packs per capita are significantly affected by the average price during a fiscal year.

```
regression <- lm(packpc~avgprs, Cigarette)
summary(regression)
```

Call:

lm(formula = packpc ~ avgprs, data = Cigarette)

Residuals:

Min	1Q	Median	3Q	Max
-56.977	-9.710	-0.716	8.550	69.451

Coefficients:

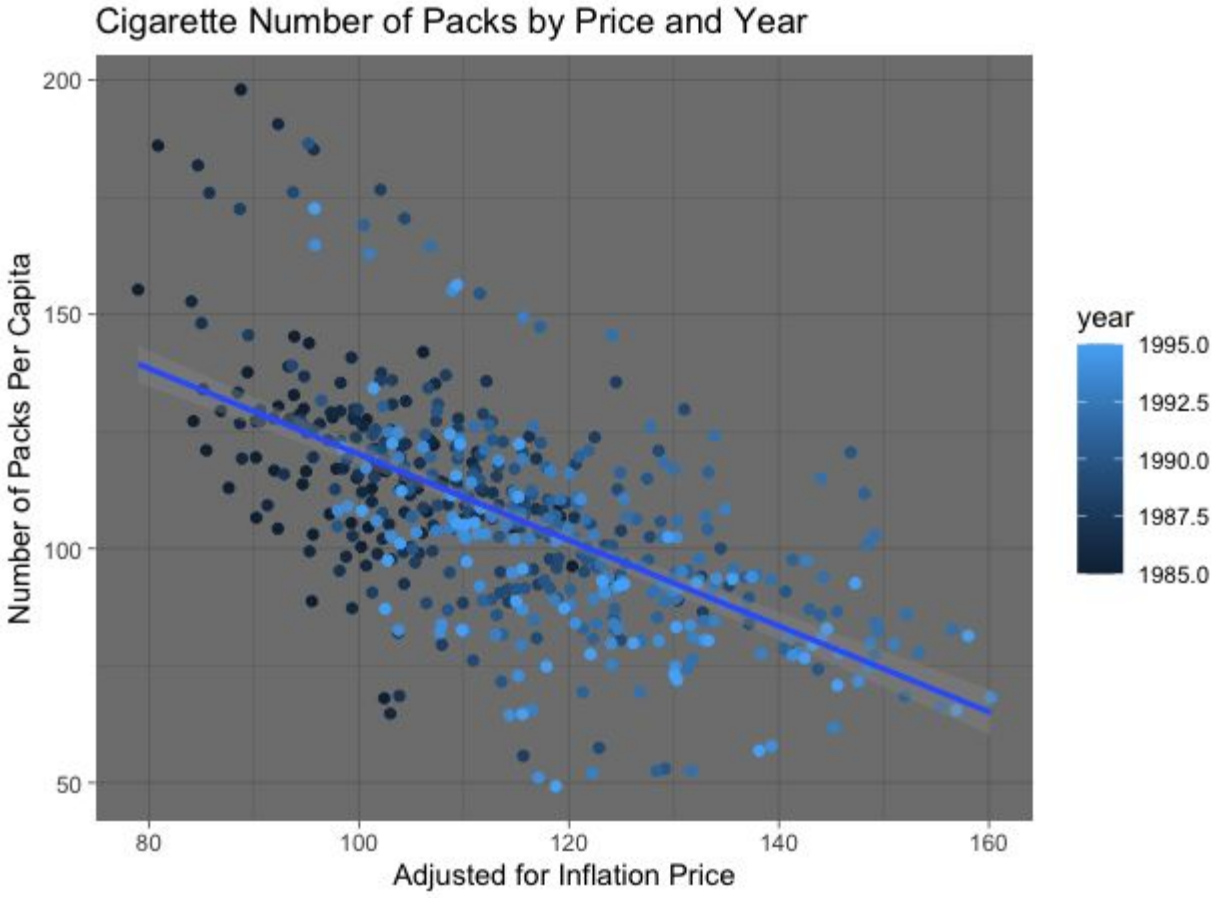
	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	167.87737	3.79749	44.21	<2e-16 ***
avgprs	-0.40879	0.02468	-16.56	<2e-16 ***

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

Residual standard error: 18.76 on 526 degrees of freedom

Multiple R-squared: 0.3427, Adjusted R-squared: 0.3415

F-statistic: 274.3 on 1 and 526 DF, p-value: < 2.2e-16



PRICE ADJUSTED FOR INFLATION=LOWER COST OVERALL

Negatively correlated.
Price (even though lower) still does seem to affect overall use.

```
ggplot(AdjustedPrice, aes(x = AdjustedCost, y = packpc, color = year)) + geom_point() + theme_dark() + geom_smooth(method = lm) +ggtitle("Cigarette Number of Packs by Price and Year") + xlab("Adjusted for Inflation Price") + ylab("Number of Packs Per Capita")
```

Similar results as previous analysis showed =

Packs per capita is still affected by average price, even adjusted for inflation

```
adjustedRegression <- lm(packpc~AdjustedCost,
AdjustedPrice)

summary(adjustedRegression)
```

Coefficients:

	Estimate	Std. Error	t value	Pr(>|t|)	
(Intercept)	211.76821	5.95792	35.54	<2e-16	***
AdjustedCost	**-0.91640**	0.05138	-17.84	<2e-16	***

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

Residual standard error: 18.27 on 526 degrees of freedom

Multiple R-squared: 0.3769, **Adjusted R-squared: 0.3757**

F-statistic: 318.1 on 1 and 526 DF, **p-value: < 2.2e-16**

Difference is significant between 1985 and 1995

Paired t-test

data: df1995$packpc and df1985$packpc

t = -14.789, df = 47, p-value < 2.2e-16

alternative hypothesis: true difference in means is not equal to 0

95 percent confidence interval:

-29.20576 -22.21151

sample estimates:

mean of the differences -25.70863

t.test(df1995$packpc, df1985$packpc, paired = TRUE)

Conclusions

Between 1985 & 1995

Cigarette use has dropped significantly

A key factor for lower cigarette use in this time frame turns out to be cost

Adjusting price for inflation did not affect as much as I thought, other than actual cost.