

1 Practice Exercise after Lecture 6

In order to test whether the retail price of gasoline varies across areas in ways that suggest price discrimination, we use ZIP code-level data on the price of gasoline in South California over time, and estimate the following regressions:

$$\widehat{\ln(R)} = -0.32 + 0.008prpblack + 0.011 \ln(income) + 0.075MC \quad n = 1462 \quad R^2 = .678 \quad (1)$$

$$\widehat{\ln(R)} = -0.010 + 0.004prpblack + 0.083MC \quad n = 1462 \quad R^2 = .608 \quad (2)$$

where R is the retail price of gasoline, $prpblack$ is the proportion of the ZIP code population that is black, $income$ the average income in the ZIP code, and MC a dummy variable for a Major City in South CA.

1. Interpret the estimated coefficients on $prpblack$ and on MC in model 1 (Remember to discuss sign and size).
2. Comparing the results from the two estimations, is discrimination larger or smaller when you control for the income variable? What do you infer from this on the correlation between the average income and the racial characteristics of the zip code (justify your claim)?

2 R applied Exercise

The following table contains the quantity and the price of a barrel of oil for twelve periods. Price is in dollars and quantity is in thousand of barrels. This table is in the Daily Assignment Folder saved as two file formats, oilDemand.dta and oilDemand.xlsx.

period	World Q	oil price
1	61440	145.43
2	62083	145.21
3	62769	134.41
4	64494	121.29
5	66023	114.24
6	67769	107.88
7	69652	103.73
8	70206	94.62
9	73530	86.70
10	74540	75.07
11	76258	73.26
12	75502	67.35

- (i) USING R, load either oilDemand.dta or the excell equivalent
- (ii) Estimate the relationship between Quantity Q and price using OLS; that is, obtain the intercept and slope estimates in the equation

$$\hat{Q} = \hat{\alpha}_0 + \hat{\alpha}_1 price$$

Comment on the direction of the relationship. Does the intercept have a useful interpretation here? Explain. How much higher is the Quantity predicted to be if the price is increased by 25 dollars?

- (iii) Create a new variable that consists of the fitted values and residuals for each observation, and verify that the residuals (approximately) sum to zero.
- (iv) What is the predicted value of Quantity when price = 100?
- (v) How much variation in Quantity for these twelve periods is explained by price? Explain.
- (vi) Plot data and fitted values into the same figure.
- (vii) . See solutions pdf and also DA6.R code file for commands to solve the above.

3 Replication Lecture 6

Feel free to replicate all we did in Lecture 6, by running in R the code Lecture6.R that uses Lecture6.dta.