ECON 7920
Econometrics II
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Problem Set 4
Due Date: April 4, 2023

Chapter 13 Problems:
13.1, 13.2, 13.3

Problem 1

Using the data set apple.csv, create a variable $ecobuy = I(ecolbs > 0)$. Using as the explanatory variables $regprc$, $ecoprc$, and age conduct the following analysis.[1]

a. Under the assumption that the structural error term is independent of all x-variables and has a standard normal distribution derive the log-likelihood function.

b. Using the log-likelihood function from above, modify the qfunction.R script file to estimate the paramaters of interest via M-estimation.

c. Compute the t statistics under the zero null for each of the x-variables on interest. Do you reject the zero null for all variables?

d. Now using the probit command in R, compare your results to the ones under probit estimation. Do you conclusions change?[2]

e. Now compute the likelihood ratio test under the null hypothesis that $ecoprc$ and age are jointly insignificant in determining $P(ecobuy = 1|x)$. Do you reject the null hypothesis?[3]

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[1] For this problem you will need the script files qfunction.R, qderivfun.R, and qderivfun2.R.

[2] probitout = glm(y~ x,family=binomial(link="probit"))

[3] Recall the command in R for the Chi-sqaured distribution function is $dchisq(LR, Q)$.