

BT2101 Homework IV

Due date: March 23, 2022 (by 9:59am)

Submission: LumiNUS Homework IV folder

I. Logit model exercise

We fit a logit model to 2380 observations in our data set on mortgage denial (deny) and the payment-to-income ratio (P/I ratio). A logit regression of deny against P/I ratio and black yields the estimated regression function as follows.

$$\Pr(\widehat{\text{deny}} = 1 | P/I \text{ ratio}, \text{black}) = F(-4.13 + 5.37 * P/I_ratio + 1.27 * \text{black})$$

(0.35) (0.96) (0.15)

* Week 9 slide example 1) A black mortgage applicant has a P/I ratio of 0.35. What is the probability that his application will be denied?

* Week 9 slide example 2) Suppose that the applicant reduced this ratio to 0.30. What effect would this have on his probability of being denied a mortgage?

- a) Repeat Week 9 slide example 1) and 2) for a white applicant.
- b) Does the marginal effect of the P/I ratio on the probability of mortgage denial depend on race? Explain.
- c) Let's suppose that the model of mortgage denial regression model result shows the coefficient on black is 0.084. What is the implicit meaning of this coefficient?
- d) Think of an important omitted variable that might bias the answer of the logit regression model. In particular, what is it and how would it bias the results of c)?

II. Exercise model specification

Suppose you collect data from a survey on wages, education, experience and gender. In addition, you ask for information about smoking.

1. Write an equation that would allow you to estimate the effects of smoking on wage while controlling for other factors. You should be able to make statement such as "smoking 1 more time per day is estimated to change wage

by $x\%$.”

2. Write a model that would allow you to test whether smoking has different effects on wages for men and women. What kind of test will you use to test the null hypothesis that there are no differences in the effects of smoking for men and women?
3. Suppose you think it is better to measure smoking by putting people into one of our categories: nonsmoker, light smoker, moderate smoker, and heavy smoker. Write a model that allows you to estimate the effects of smoking on wage. Explain in detail how to test the null hypothesis that smoking has no effect on wages.