ECOM30003/ECOM90003: Applied Microeconometric Modelling
Tutorial 9

Please read Chapter 17 & 7.5 of Wooldridge before attempting the following.

1. Let *grad* be a dummy variable for whether a student-athlete at a large university graduates in five years. Let $hsGPA$ and SAT be high school grade point average and SAT score respectively. Let *study* be the number of hours spent per week in an organized study hall. Suppose that, using data on 420 student athletes, the following logit model is obtained

   $$\hat{P}(grad = 1|hsGPA, SAT, study) = \Lambda(-1.17 + 0.24 hsGPA + 0.00058 SAT + 0.073 study)$$

   where $\Lambda(z) = exp(z)/[1 + exp(z)]$ is the logit function.

   Holding $hsGPA$ fixed at 3.0 and SAT fixed at 1200, compute the estimated difference in the graduation probability for someone who spent 10 hours per week in study hall and someone who spent 5 hours per week.

2. Use the data in LOANAPP.dta for this exercise.

   The dependent binary variable is *approve* which is equal to one if a mortgage loan to an individual was approved. The key explanatory variable is *white*, a dummy variable equal to one if the applicant was white. The other applicants in the data set are black and Hispanic. To test for discrimination in the mortgage loan market, a LPM can be used :

   $$approve = \beta_0 + \beta_1 white + otherfactors$$

   (a) If there is discrimination against minorities, and the appropriate factors have been controlled for, what is the sign of β_1?

   (b) Regress *approve* on *white* and report the results in the usual form. Interpret the coefficient on *white*. Is it statistically significant? Is it practically large?

   (c) Add the variables *hrat*, *obrat*, *loanprc*, *unem*, *male*, *married*, *dep*, *sch*, *cisugb*, *chist*, *pubrec*, *mortlat*1 , *mortlat*2, *vr* to the model as regressors. What happens to the coefficient on *white*? Is there still evidence of discrimination against nonwhites?

   (d) Now allow the effect of race to interact with the variable measuring other obligations as a percentage of income, *obrat*. Is the interaction term significant?

(e) Using the model from part(d) what is the effect of being *white* on the probability of approval when *obrate* = 32 which is roughly the mean value in the sample? Obtain 95% CI for this effect.

3. Use the data in LOANAPP.dta for this exercise.

(a) Estimate a probit model of *approve* on *white*. Find the estimated probability of loan approval for both whites and nonwhites. How do these compare with the linear probability model?

(b) Now add the variables *hrat*, *obrat*, *loanprc*, *unem*, *male*, *married*, *dep*, *sch*, *cisugb*, *chist*, *pubrec*, *mortlat*1, *mortlat*2, *vr* to the probit model. Is there statistically significant evidence of discrimination against nonwhites?

(c) Estimate the model from part (b) by logit. Compare the coefficient on *white* to the probit estimates.

(d) Estimate the sizes of the discrimination effects for probit and logit.