Introductory Econometrics

Tutorial 7

Part A: To prepare for this week's quiz review the lecture notes for Topic 6 and Topic 7

Part B: This part of the homework will be covered in the tutorial. However, you are encouraged to attempt these questions before the tutorial.

Q1 The purpose of this question is to investigate the influence of various factors on the probability of an individual having had an affair. **The workfile 'affair.wf1'has been placed on Moodle**. The workfile contains 601 observations. The data were collected from a random sample of Monash University academic staff members (Just kidding!!). The variables are:

Variable Code	Description
$affair_i$	1 if individual i has had at least one affair, 0 otherwise
age_i	age in years of individual i
$educ_i$	years of schooling of individual i
$hapmarr_i$	1 if individual i rates their marriage rated happy, 0 otherwise
$kids_i$	1 if individual i has children, 0 otherwise
$male_i$	1 if individual i is male, 0 otherwise
rel_i	1 if individual i is religious, 0 otherwise
$yrsmarr_i$	number of years married for which individual i has been married

Let

$$affair_i = \begin{cases} 1 & \text{with probability } p_i \\ 0 & \text{with probability } 1\text{-}p_i. \end{cases},$$

where p_i denotes the probability that individual i has had an affair.

(**a**) Prove that

$$E(affair_i) = p_i.$$

(**b**) Assume that

$$E(affair_i|age_i, educ_i, hapmarr_i, kids_i, male_i, rel_i, yrsmarr_i) \quad (1)$$
$$= \beta_0 + \beta_1 age_i + \beta_2 educ_i + \beta_3 hapmarr_i + \beta_4 kids_i + \beta_5 male_i + \beta_6 rel_i + \beta_7 yrsmarr_i.$$

i) What is the probability that an unhappily married, child-free, 30 year old, religious male, with 12 years of education who has been married for 10 years, has had an affair?

ii) What is the marginal effect of gender on the probability of having had an affair, controlling for the variables age, educ, hapmarr, kids, rel and yrsmarr?

(**c**) Estimate the linear regression equation

$$affair_i = \beta_0 + \beta_1 age_i + \beta_2 educ_i + \beta_3 hapmarr_i + \beta_4 kids_i + \beta_5 male_i + \beta_6 rel_i + \beta_7 yrsmarr_i + u_i \quad (2)$$

by OLS.

i) Report the estimated equation.

ii) Are the regressors jointly significant? Briefly explain.

iii) Evaluate the explanatory power of the regressors.

iv) Is there any evidence that males are more likely than females with the same characteristics to have had an affair?

(**d**) Test the joint significance of the individually insignificant regressors in (2). Specify the unrestricted and restricted models, the null and alternative hypotheses, the form and null distribution of the test statistic, the sample and critical values of the test statistic and your test conclusion. Test at the **10**% significance level.

(**e**) Consider the linear regression model

$$affair_i = \alpha_0 + \alpha_1 age_i + \alpha_2 hapmarr_i + \alpha_3 rel_i + \alpha_4 yrsmarr_i + u_i, i = 1, 2, \ldots, n, \quad (3)$$

where

$$E(u_i|age_i, hapmarr_i, rel_i, yrsmarr_i) = 0.$$

i) Extend the model given by (3) to allow for the possibility that the marginal effect of being happily married on the probability of having had an affair may be different for religious and nonreligious people.

ii) Is the proposition in i) supported by the data? Briefly explain.

(**f**) Let

$$affair_i = \alpha_0 + \alpha_1 age_i + \alpha_2 hapmarr_i + \alpha_3 rel_i + \alpha_4 yrsmarr_i + u_i, i = 1, 2, \ldots, n, \quad (3)$$

where

$$E(u_i | age_i, hapmarr_i, rel_i, yrsmarr_i) = 0.$$

i) Define the population of category A individuals to be the population of unhappily married, nonreligious people ,aged 30, who have been married for 2 years. What is the probability that a category A person has had an affair?

ii) Define the population of category B individuals to be the population of unhappily married, religious people, aged 30, who have been married for 1 year. What is the probability that a category B person has had an affair?

iii) What are the restrictions on the parameters of (3) implied by the null hypothesis that the probability that a category A person has had an affair is the same as the probability that a category B person has had an affair.

(**g**) Use the model specified in (3) to test the null hypothesis that the probability that a category A person has had an affair is the same as the probability that a category B person has had an affair, against the alternative hypothesis that the probability of a category A person having had an affair is greater.