

## Assignment 12

### Poisson – Negative Binomial – Zero Inflated Poisson

#### The model

The generalized linear regression model can be stated as:

$$I_i = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \beta_3 x_{3i} + \beta_4 x_{4i} + u_i \quad (1)$$

and

$$\Pr(Y_i = y_i) = f(I_i)$$

where:  $I_i$  is index variables.

$y_i$  is counted number 0, 1, 2,...

$x_{ki}$  is independent variable  $k$ .

$f(\cdot)$  is either Poisson or Negative Binomial probability distribution function.

$u_i$  is disturbance term.

#### Requirements (using Data set file – assign12.dta ):

- 1 Estimate models for  $y_i$  assuming that the model is traditional linear regression model. Interpret your estimated result.
- 2 Create histogram for  $y_i$ . Determine whether there is limitation of dependent variable in this case. If yes, what type of limitation is it?
- 3 Estimate models for  $y_i$  assuming that the probability functions follow Poisson probability distribution. Perform GOF test and determine whether Poisson is appropriated in this case. Interpret the estimated result (sign and meaning (in term of incidence-rate ratios), overall test, individual test, pseudo  $R^2$ , marginal effects).
- 4 Estimate models for  $y_i$  assuming that the probability functions follow Negative Binomial probability distribution. Determine whether Negative Binomial regression model is appropriated in this case. Interpret your estimated result (sign and meaning (in term of incidence-rate ratios), overall test, individual test, pseudo  $R^2$ , marginal effects).
- 5 Estimate models for  $y_i$  assuming that the model is Zero Inflated Poisson ( $x_{1i}$ ,  $x_{2i}$ , and  $x_{3i}$  are independent variables in Poisson model and  $x_{4i}$  is independent variable in Inflated (Logit) model). Interpret your estimated result. Determine which model (Linear regression model, Poisson, Negative Binomial, or ZIP) is the most appropriated model in this case? Why? (provide the tests)
- 6 According to the above (1-5), determine the most appropriated model for this case. Give explanation why?