Temple University

Economics 8190

Fall 2011

1. A binomial probability model is to be based on the following index function model:

$$\begin{matrix}y^{\*}=α+βd+ε\\y=1 if y^{\*}>0\\y=0 otherwise\end{matrix}$$

The only regressor, d, is a dummy variable. The data consist of 100 observations that have the following:

|  |  |  |
| --- | --- | --- |
|  |  | y |
|  |  | 0 | 1 |
| d | 0 | 24 | 28 |
| 1 | 32 | 16 |

1. Obtain the maximum likelihood estimators of α and β, estimate the asymptotic standard errors of your estimates.
2. Test the hypothesis that β = 0 by using a Wald test and a likelihood ratio test.
3. Do parts a. and b. again using a probit model.
4. Do parts a. and b. again using a logit model.

[hint: Formulate the log likelihood in terms of α and δ = α + β.]

1. Data on t = strike duration and x = unanticipated industrial production for a number of strikes in each of nine years are given in the data file strikes.txt. Use the Poisson regression model to determine whether x is a significant determinant of the number of strikes in a given year.

For the next two questions use the following data:

|  |
| --- |
| 3.8396 7.2040 0.0000 0.00000 4.4232 8.02305.7971 7.0828 0.0000 0.80260 13.0670 4.32110.0000 8.6801 5.4571 0.00000 8.1021 0.00001.2526 5.6016 |

1. Using all 20 observations we presume that the data has been censored so that the applicable model is $\begin{matrix}y\_{i}^{\*}=μ+ε\_{i}\\y\_{i}=y\_{i}^{\*} if μ+ε\_{i}>0, 0 otherwise\\ε\_{i}\~N[0,σ^{2}]\end{matrix}$. In such a model if the observed value of the variable is less than zero it is recorded as a zero.
	1. Compute the mean using all 20 observations. Does this estimator over- or underestimate the population mean?
	2. Compute the sample variance using all 20 observations. Does this estimator over- or underestimate the population variance?
	3. The proposed model in the introduction to the question is a simple tobit model. Formulate the log-likelihood for this model.
	4. Compute the maximum likelihood estimates of μ and σ
2. Suppose that your research assistant compiled the above dataset, he gave you only the nonzero values and lost track of the number of recorded zeros. In effect you must now work with a truncated dataset. Use the 15 nonzero data points to estimate the mean and variance of the truncated distribution using the method of moments.