

Econometrics II

Spring 1999

Assignment 9

Please show all of your work and clearly indicate your final response to each question.

1. Amemiya 11.8
2. Amemiya 11.14
3. A random sample ($n = 20$) of completed unemployment spell durations is made available to you. The spell lengths are given by (14.2, 16.4, 3.8, 9.7, 1.2, 17.9, 3.6, 8.9, 9.2, 11.3, 15.9, 8.7, 5.2, 23.4, 6.9, 11.28, 19.1, 22.3, 4.7, 14.27).
 1. Assume that the population distribution of unemployment spell lengths is negative exponential, with the density given by $f(t; \alpha) = \alpha \exp(-\alpha t)$, $\alpha > 0$. Obtain the maximum likelihood estimate of α and its asymptotic standard error (don't worry about the issue of having a small sample).
 2. Assume that the population distribution is Weibull, with $f(t; \alpha, \beta) = \alpha\beta(\alpha t)^{\beta-1} \exp(-(\alpha t)^\beta)$, $\alpha > 0$, $\beta > 0$. Find the maximum likelihood estimates of α and β and their asymptotic standard errors. Test whether the negative exponential provides an "adequate fit" to these data.
 3. Assume that the population density is exponential with parameter α_i , where i denotes the individual's (unobserved) type. Assume that there are two types in the population, with $\alpha_1 < \alpha_2$ and let the population proportion of type 1 be given by π_1 . Attempt to fit this model to the data (you may have some numerical problems - if so, document them), and determine whether the homogeneous model (with one type, not two) provides an adequate fit to the data.

4. The attached codebook describes the GAUSS data set DYN_DC which is downloadable from my home page. In each year, the probability of finding the woman employed is assumed to be given by:

$$\text{prob}(emp_{it} = 1|X_{it}) = \frac{\exp(\alpha_i + \beta_1 msp_{it} + \beta_2 grade_i + \beta_3 age_{it})}{1 + \exp(\alpha_i + \beta_1 msp_{it} + \beta_2 grade_i + \beta_3 age_{it})}, \quad (0.1)$$

where the variables are defined in the codebook.

1. Assuming that $\alpha_i = \alpha_0$ for all i , estimate (0.1) using the data for 1985. Repeat using the data for 1986. If available, conduct a specification test regarding the invariance of the coefficients in the logit over the two year period.
2. Assume that α_i is unrestricted. Define a consistent estimator for some subset of parameters in β under this assumption. If possible, construct and conduct a test of $H_0 : \alpha_i = \alpha_0$, all i versus $H_A : \alpha_i \neq \alpha_0$.

Codebook for

DYN_DC

This data set is an extract from the random sample portion of the NLSY79. It contains data for 1985 and 1986 for women not attending school in either year. There are 10 variables.

Column	Variable Name	Description
1	nonwhite	= 1 if R is black or hispanic
2	emp_85	= 1 if R employed at time of 85 interview
3	emp_86	= 1 if R employed at time of 86 interview
4	msp_85	= 1 if R married at time of 85 interview
5	msp_86	= 1 if R married at time of 86 interview
6	grade	grade of schooling completed
7	age	age at 85 interview
8	kids	number of children, 1985
9	kid_le_5	= 1 if any children ≤ 5 in 1985
10	dur_u	duration of unemployment at 1985 interview