

Computer Exercise 7 Answers. More on Maximum Likelihood

Read in the data set `cex8.dta` from the website, which contains 519 observations on the binary variable `emp` (1=employed, 0=otherwise) and the age and gender of the respondent (1=male 0=female)

1. Run a logit model of the probability that an individual is observed in work conditional on age and gender

(the stata format for this type of estimation is

logit dependent variable independent variables

`logit emp age male`

Iteration 0: log likelihood = -355.14307
Iteration 1: log likelihood = -296.19866
Iteration 2: log likelihood = -294.15812
Iteration 3: log likelihood = -294.13715
Iteration 4: log likelihood = -294.13714

Logistic regression

Number of obs = 519
LR chi2(2) = 122.01
Prob > chi2 = 0.0000
Pseudo R2 = 0.1718

Log likelihood = -294.13714

emp	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
age	-.0646149	.0068157	-9.48	0.000	-.0779734	-.0512564
male	.3604886	.2020208	1.78	0.074	-.0354649	.756442
_cons	2.061762	.2781102	7.41	0.000	1.516676	2.606848

Now see if you can program the maximum likelihood estimator of this model using the “ml” maximum likelihood command in stata and the basic syntax for maximum likelihood use in the previous problem set

```
program drop _all
```

```
program mylogit
version 8.0
args lnf xb
quietly replace `lnf'=log(exp(`xb')/(exp(`xb')+1)) if $ML_y1==1
quietly replace `lnf'=log(1-(exp(`xb')/(exp(`xb')+1))) if $ML_y1==0
end
```

```
/* this is just the log likelihood for the logit model (see lecture notes) */
```

```
ml model lf mylogit (emp=age male)  
ml maximize, difficult
```

```
initial:    log likelihood = -359.74339  
alternative: log likelihood = -358.54595  
rescale:    log likelihood = -355.16256  
Iteration 0: log likelihood = -355.16256  
Iteration 1: log likelihood = -294.94433  
Iteration 2: log likelihood = -294.14001  
Iteration 3: log likelihood = -294.13714  
Iteration 4: log likelihood = -294.13714
```

```
Number of obs =    519  
Wald chi2(2)  =   90.07  
Prob > chi2   =   0.0000
```

```
Log likelihood = -294.13714
```

emp	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
age	-.0646149	.0068157	-9.48	0.000	-.0779734	-.0512564
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