Problem Set 1 Solutions

Tyler Ransom

Directions: Answer all questions. Clearly label all answers. Show all of your code. Compute standard errors for all parameter estimates. Turn in the following to me via your dropbox (in a folder labeled 'MatlabPS2.1') in Sakai by 11:59 p.m. on Thursday, July 26, 2012:

- m-file(s)
- a log file (from off the cluster)
- matsub.oXXXXX file
- pdf version of your writeup with its LaTeXsource code

Put the names of all group members at the top of your writeup (each student must turn in his/her own materials).

1. Multinomial Logit.
   (a) See m-code
   (b) See results in Table 1.
   (c) See results in Table 2. Coefficients and standard errors are the same to two decimal places
   (d) β_{5j} is the effect of an additional year of schooling on the probability of choosing choice j (in relation to the base choice, "other").
2. Unobserved heterogeneity (Fixed and Random Effects).
   (a) See Table 3.
   (b) See Table 3. The coefficients on male, hgc and BA all go down a little bit when including the full set of regressors. The coefficients on experience, Diploma, and AA (and the constant) all go up. This relates to unobserved heterogeneity because AFQT and mother's education are time-invariant unobservables which are correlated with the other covariantes (e.g. own education). This exercise was meant to approximate for unobserved heterogeneity by treating some time invariant regressors as unobservables.
   (c) See Table 4. Examples of variables in the error term in (a) and (b) but not (c) [and which are correlated with the regressors] are: father's education, family income at age 12, and innate ability. Each of these variables is time-invariant, and so is differenced out by the fixed effect estimator.

(d) See Table 5. `male` goes down with RE; `AFQT` goes down with RE; `Mhgc` stays the same; `hgc` goes up with both FE and RE; `exper` stays pretty much the same; `Diploma` goes up with FE and down with RE; `AA` goes down with FE and RE; `BA` goes up with FE and RE. As you can see, there is no hard-and-fast rule for how coefficients change when unobserved heterogeneity is corrected for. The estimates also are sensitive to the assumptions about the structure of the unobserved heterogeneity.

Table 1: Multinomial Logit Coefficients (`fminunc`)

	Coefficients		Standard Errors	
	(school)	(work)	(school)	(work)
constant	-3.437	-0.444	0.362	0.165
male	0.344	0.222	0.072	0.032
AFQT	-0.237	-0.208	0.043	0.019
Mhgc	0.038	-0.012	0.014	0.006
hgc	0.017	-0.177	0.026	0.013
exper	-0.417	1.034	0.042	0.013
Diploma	0.332	1.016	0.137	0.053
AA	-0.283	0.736	0.191	0.071
BA	-0.032	2.252	0.156	0.061
log likelihood	-3,877.14			
$N \times T$	32,370			

Table 2: Multinomial Logit Coefficients (`mnrfit`)

	Coefficients		Standard Errors	
	(school)	(work)	(school)	(work)
constant	-3.437	-0.443	0.362	0.165
male	0.344	0.222	0.072	0.032
AFQT	-0.237	-0.208	0.043	0.019
Mhgc	0.038	-0.012	0.014	0.006
hgc	0.017	-0.177	0.026	0.013
exper	-0.417	1.034	0.042	0.013
Diploma	0.333	1.016	0.137	0.053
AA	-0.283	0.736	0.191	0.071
BA	-0.031	2.252	0.156	0.061

Table 3: Pooled OLS Coefficients

	2(a)		2(b)	
	Coeff.	Std. Err.	Coeff.	Std. Err.
constant	1.297	0.033	1.420	0.037
male	0.121	0.006	0.119	0.006
AFQT	—	—	0.035	0.004
Mhgc	—	—	-0.003	0.001
hgc	0.047	0.003	0.040	0.003
exper	0.051	0.002	0.052	0.002
Diploma	0.000	0.011	0.001	0.011
AA	0.129	0.015	0.134	0.015
BA	0.173	0.013	0.170	0.013

Table 4: Fixed Effects Coefficients

	Coeff.	Std. Err.
constant	—	—
male	—	—
AFQT	—	—
Mhgc	—	—
hgc	0.050	0.007
exper	0.051	0.004
Diploma	0.015	0.105
AA	0.113	0.034
BA	0.180	0.021

Table 5: Random Effects Coefficients

	Coeff.	Std. Err.
constant	1.387	0.046
male	0.116	0.009
AFQT	0.031	0.006
Mhgc	-0.003	0.002
hgc	0.043	0.004
exper	0.052	0.002
Diploma	-0.014	0.016
AA	0.126	0.021
BA	0.185	0.015
$\hat{\sigma}_{\alpha}^{2}$	0.1084	—
$\hat{\sigma}_{\varepsilon}^{2}$	0.1284	—