

Assignment 7

6204640178
Mai Surintraaboon

From the given data set (assign7.dta):

- Estimate model (1) using Panel Least Squares estimation method and PGLS assuming Heteroskedasticity, and test whether there exists Heteroskedasticity problem.

```
8 . lrtest hetero, df(`df')
```

```
Likelihood-ratio test  
(Assumption: PGLS nested in hetero)
```

```
LR chi2( 254) = 619.86  
Prob > chi2 = 0.0000
```

From the above LR test, $p\text{-value} = 0.000$. Thus, we can reject H_0 , meaning there exists heteroskedasticity problem.

$H_0 =$ no heteroskedasticity

→ attached in the output pages

- Estimate the above three models including Panel Least Squares model, Fixed effects model, and Random-effects model. Perform fixed effects tests and random effects test, also state null hypothesis of the tests. Then, determine the most appropriated model. Also, give explanation of the choosing criterion (perform the tests), and make interpretation of the estimated models.

The null hypothesis of the test is $H_0: \alpha_1 = \alpha_2 = \dots = \alpha'$.

```
F test that all u_i=0: F( 254, 1013) = 11.40
```

```
Prob > F = 0.0000
```

We can reject H_0 from the F-test. Thus, there exist fixed effects in the model.

In determining the most appropriate model, we have to take another test into consideration: the hausman test.

```
Test: Ho: difference in coefficients not systematic
```

```
chi2( 7) = (b-B)'[(V_b-V_B)^(-1)](b-B)  
= 190.39  
Prob>chi2 = 0.0000  
(V_b-V_B is not positive definite)
```

According to this test, we can reject H_0 as the $P\text{-value}$ is less than 0.05. Thus, the fixed effects model is the most appropriated model.

The criteria used for choosing the model is the result from both fixed effects test and hausman test.

```
name: <unnamed>
log: C:\Users\user\Documents\BE TU\Year2\EE426\HW8\8.5.smcl
log type: smcl
opened on: 17 Mar 2021, 23:59:26
```

```
1 . use "C:\Users\user\Downloads\assign7.dta"

2 . xtset crossid t
    panel variable:  crossid (strongly balanced)
    time variable:   t, 1 to 5
    delta:           1 year

3 . xtgls y x1 x2 x3 x4 x5 x6 x7, igls panels(heteroskedastic)nolog
```

Cross-sectional time-series FGLS regression

Coefficients: **generalized least squares**
Panels: **heteroskedastic**
Correlation: **no autocorrelation**

Estimated covariances	=	255	Number of obs	=	1,275
Estimated autocorrelations	=	0	Number of groups	=	255
Estimated coefficients	=	8	Time periods	=	5
			Wald chi2(7)	=	3850.64
Log likelihood	=	519.361	Prob > chi2	=	0.0000

y	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
x1	.0834067	.0045748	18.23	0.000	.0744403	.0923732
x2	.0163976	.0032919	4.98	0.000	.0099456	.0228497
x3	-.3631261	.0505673	-7.18	0.000	-.4622362	-.264016
x4	.3191455	.1093883	2.92	0.004	.1047484	.5335426
x5	-.1093301	.0043601	-25.07	0.000	-.1178758	-.1007844
x6	.1361732	.0275038	4.95	0.000	.0822667	.1900797
x7	-.2282655	.0063087	-36.18	0.000	-.2406303	-.2159007
_cons	-.037658	.0426502	-0.88	0.377	-.1212509	.0459349

```
4 . estimate store hetero

5 . xtgls y x1 x2 x3 x4 x5 x6 x7
```

Cross-sectional time-series FGLS regression

Coefficients: **generalized least squares**
Panels: **homoskedastic**
Correlation: **no autocorrelation**

Estimated covariances	=	1	Number of obs	=	1,275
Estimated autocorrelations	=	0	Number of groups	=	255
Estimated coefficients	=	8	Time periods	=	5
			Wald chi2(7)	=	899.95
Log likelihood	=	209.4322	Prob > chi2	=	0.0000

y	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
x1	.0794732	.0093881	8.47	0.000	.0610728	.0978735
x2	.0183375	.0051421	3.57	0.000	.0082592	.0284158
x3	.0977707	.0526329	1.86	0.063	-.0053879	.2009293
x4	.0873838	.2186064	0.40	0.689	-.3410767	.5158444
x5	-.1076457	.0069214	-15.55	0.000	-.1212114	-.0940801
x6	-.1432493	.0186811	-7.67	0.000	-.1798637	-.106635
x7	-.2712849	.011995	-22.62	0.000	-.2947946	-.2477753
_cons	-.0107965	.0860341	-0.13	0.900	-.1794201	.1578272

```

6 . estimate store PGLS

7 . local df = e(N_g) - 1

8 . lrtest hetero, df(`df')

```

Likelihood-ratio test
(Assumption: PGLS nested in hetero)

LR chi2(254) = 619.86
Prob > chi2 = 0.0000

```

9 . b.
b. is not a valid command name
r(199);

```

```
10 . xtglsl y x1 x2 x3 x4 x5 x6 x7
```

Cross-sectional time-series FGLS regression

Coefficients: **generalized least squares**
Panels: **homoskedastic**
Correlation: **no autocorrelation**

Estimated covariances = 1 Number of obs = 1,275
Estimated autocorrelations = 0 Number of groups = 255
Estimated coefficients = 8 Time periods = 5
Log likelihood = 209.4322 Wald chi2(7) = 899.95
Prob > chi2 = 0.0000

y	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
x1	.0794732	.0093881	8.47	0.000	.0610728	.0978735
x2	.0183375	.0051421	3.57	0.000	.0082592	.0284158
x3	.0977707	.0526329	1.86	0.063	-.0053879	.2009293
x4	.0873838	.2186064	0.40	0.689	-.3410767	.5158444
x5	-.1076457	.0069214	-15.55	0.000	-.1212114	-.0940801
x6	-.1432493	.0186811	-7.67	0.000	-.1798637	-.106635
x7	-.2712849	.011995	-22.62	0.000	-.2947946	-.2477753
_cons	-.0107965	.0860341	-0.13	0.900	-.1794201	.1578272

```

11 . xtglsl y x1 x2 x3 x4 x5 x6 x7, fe
option fe not allowed
r(198);

```

```
12 . xtreg y x1 x2 x3 x4 x5 x6 x7, fe
```

Fixed-effects (within) regression Number of obs = 1,275
Group variable: **crossid** Number of groups = 255

R-sq: Obs per group:

within = 0.3772 min = 5
between = 0.1103 avg = 5.0
overall = 0.1644 max = 5

corr(u_i, Xb) = -0.2003 F(7,1013) = 87.64
Prob > F = 0.0000

y	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
x1	-.1256447	.0180942	-6.94	0.000	-.161151	-.0901384
x2	.0123739	.008023	1.54	0.123	-.0033697	.0281176
x3	.0747825	.039773	1.88	0.060	-.0032643	.1528293
x4	.6493144	.2855092	2.27	0.023	.0890573	1.209572
x5	-.1104883	.0061097	-18.08	0.000	-.1224773	-.0984992
x6	-.1461423	.0141035	-10.36	0.000	-.1738178	-.1184669
x7	-.0951497	.0121853	-7.81	0.000	-.1190611	-.0712383
_cons	1.756067	.1658407	10.59	0.000	1.430636	2.081497
sigma_u	.22676694					
sigma_e	.11725953					
rho	.78902632	(fraction of variance due to u_i)				

F test that all u_i=0: F(254, 1013) = 11.40 Prob > F = 0.0000

```
13 . estimate store fixed
14 . xtreg y x1 x2 x3 x4 x5 x6 x7, re
```

Random-effects GLS regression
Group variable: **crossid**

Number of obs = 1,275
Number of groups = 255

R-sq:
within = 0.3492
between = 0.3404
overall = 0.3377

Obs per group:
min = 5
avg = 5.0
max = 5

corr(u_i, X) = 0 (assumed)

Wald chi2(7) = 663.43
Prob > chi2 = 0.0000

y	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
x1	-.0145018	.0133366	-1.09	0.277	-.040641	.0116375
x2	.0146948	.0064463	2.28	0.023	.0020604	.0273292
x3	.0985565	.0399464	2.47	0.014	.020263	.1768501
x4	.4693539	.2493856	1.88	0.060	-.0194329	.9581407
x5	-.1117985	.005959	-18.76	0.000	-.1234779	-.100119
x6	-.1541318	.014125	-10.91	0.000	-.1818163	-.1264472
x7	-.1494529	.0115006	-13.00	0.000	-.1719937	-.1269122
_cons	.7714573	.1226841	6.29	0.000	.5310009	1.011914
sigma_u	.15944933					
sigma_e	.11725953					
rho	.64900604	(fraction of variance due to u_i)				

```
15 . estimate store random
16 . hausman fixed random
```

	Coefficients		(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
	(b) fixed	(B) random		
x1	-.1256447	-.0145018	-.1111429	.0122284
x2	.0123739	.0146948	-.0023208	.0047765
x3	.0747825	.0985565	-.0237741	.
x4	.6493144	.4693539	.1799605	.1390048
x5	-.1104883	-.1117985	.0013102	.0013484
x6	-.1461423	-.1541318	.0079894	.
x7	-.0951497	-.1494529	.0543033	.0040273

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(7) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 190.39
Prob>chi2 = 0.0000
(V_b-V_B is not positive definite)

```
17 . log close
    name: <unnamed>
    log: C:\Users\user\Documents\BE TU\Year2\EE426\HW8\8.5.smcl
    log type: smcl
    closed on: 18 Mar 2021, 00:07:18
```