

Assignment 4

1.

```
. use "C:\Users\Kittitat Thubtong\Downloads\Assignment 4 (3).dta"

. xtglm 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

```
. est store het

. xtglm 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

```
. est store pgls

. local df=e(N_g)-1

. lrtest het, df(`df')
```

Likelihood-ratio test
(Assumption: **pgls** nested in **het**)

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

From the LR-test, the value of chi-square is 619.86 with the p-value less than 0.05. So, there exists a significant heteroskedastic problem in the model.

2.

```
. xtglm 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

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x1	.0794732	.0093881	8.47	0.000	.0610728	.0978735
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x7	-.2712849	.011995	-22.62	0.000	-.2947946	-.2477753
_cons	-.0107965	.0860341	-0.13	0.900	-.1794201	.1578272

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

Fixed-effects (within) regression
 Group variable: **crossid**

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

R-sq:

within = 0.3772
 between = 0.1103
 overall = 0.1644

Obs per group:

min = 5
 avg = 5.0
 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

```
. est store fixed
```

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

```
Random-effects GLS regression           Number of obs   =    1,275
Group variable: crossid                 Number of groups =     255

R-sq:                                   Obs per group:
    within = 0.3492                      min =          5
    between = 0.3404                     avg =         5.0
    overall = 0.3377                     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)				

```
. est store random
```

```
. hausman fixed random
```

	Coefficients			
	(b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
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)
```

From the fixed effect test, there is the significant fixed effects. From the hausman test, the value of chi-square is 190.39 with p-value less than 0.05. We can conclude that fixed effects model is more appropriate than the random effects model.