(R)
Statistics/Data Analysis

(R)
Statistics/Data Analysis **14.0**

MP - Parallel Edition

StataCorp
4905 Lakeway Drive
College Station, Texas 77845 USA
800-STATA-PC http://www.stata.com
979-696-4600 stata@stata.com
979-696-4601 (fax)

Single-user 8-core Stata perpetual license:
Serial number: 10699393
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Notes:
1. Unicode is supported; see help unicode advice.
2. More than 2 billion observations are allowed; see help obs advice.
3. Maximum number of variables is set to 5000; see help set maxvar.

```
1 . use "C:\Users\com\Downloads\assign7.dta", clear

2 . log using "C:\Users\com\Downloads\assign 7.smcl"
-------------------------------------------------------------------------------
      name: <unnamed>
       log: C:\Users\com\Downloads\assign 7.smcl
  log type: smcl
 opened on: 17 Mar 2021, 21:06:58

3 . xtset crossid time
        panel variable: crossid (strongly balanced)
         time variable: time, 40 to 44
                 delta: 1 year

4 . xtgls y x1 x2 x3 x4 x5 x6 x7, igls panels(heteroskedasticity)
panel(heteroskedasticity) invalid
r(198);

5 . xtgls y x1 x2 x3 x4 x5 x6 x7, igls panels(heteroskedasticit)
panel(heteroskedasticit) invalid
r(198);

6 . xtgls y x1 x2 x3 x4 x5 x6 x7, igls panels(heteroskedastic)
Iteration 1: tolerance = .08868167
Iteration 2: tolerance = .05849043
Iteration 3: tolerance = .03525359
Iteration 4: tolerance = .02040677
Iteration 5: tolerance = .01187668
Iteration 6: tolerance = .00709681
Iteration 7: tolerance = .00441169
Iteration 8: tolerance = .00291535
Iteration 9: tolerance = .00321184
Iteration 10: tolerance = .00409533
Iteration 11: tolerance = .00580092
Iteration 12: tolerance = .00908183
Iteration 13: tolerance = .01574945
Iteration 14: tolerance = .02974716
Iteration 15: tolerance = .05103653
Iteration 16: tolerance = .04401112
Iteration 17: tolerance = .00723478
Iteration 18: tolerance = .00429598
Iteration 19: tolerance = .0028681
Iteration 20: tolerance = .00195025
Iteration 21: tolerance = .00134658
```

```
Iteration 22: tolerance = .00105022
Iteration 23: tolerance = .00117237
Iteration 24: tolerance = .00122304
Iteration 25: tolerance = .00122651
Iteration 26: tolerance = .00119949
Iteration 27: tolerance = .00115339
Iteration 28: tolerance = .00109594
Iteration 29: tolerance = .00103239
Iteration 30: tolerance = .00096626
Iteration 31: tolerance = .00089991
Iteration 32: tolerance = .0008349
Iteration 33: tolerance = .00077221
Iteration 34: tolerance = .00071245
Iteration 35: tolerance = .00065597
Iteration 36: tolerance = .00060292
Iteration 37: tolerance = .00055335
Iteration 38: tolerance = .00050721
Iteration 39: tolerance = .0004644
Iteration 40: tolerance = .00042478
Iteration 41: tolerance = .0003882
Iteration 42: tolerance = .00035448
Iteration 43: tolerance = .00032344
Iteration 44: tolerance = .00029493
Iteration 45: tolerance = .00026875
Iteration 46: tolerance = .00024476
Iteration 47: tolerance = .00022279
Iteration 48: tolerance = .00020268
Iteration 49: tolerance = .0001843
Iteration 50: tolerance = .00016751
Iteration 51: tolerance = .00015219
Iteration 52: tolerance = .00013821
Iteration 53: tolerance = .00012547
Iteration 54: tolerance = .00011386
Iteration 55: tolerance = .0001033
Iteration 56: tolerance = .00009368
Iteration 57: tolerance = .00008494
Iteration 58: tolerance = .00007699
Iteration 59: tolerance = .00006977
Iteration 60: tolerance = .00006321
Iteration 61: tolerance = .00005725
Iteration 62: tolerance = .00005184
Iteration 63: tolerance = .00004694
Iteration 64: tolerance = .00004249
Iteration 65: tolerance = .00003846
Iteration 66: tolerance = .0000348
Iteration 67: tolerance = .00003149
Iteration 68: tolerance = .00002849
Iteration 69: tolerance = .00002577
Iteration 70: tolerance = .00002331
Iteration 71: tolerance = .00002108
Iteration 72: tolerance = .00001906
Iteration 73: tolerance = .00001724
Iteration 74: tolerance = .00001559
Iteration 75: tolerance = .00001409
Iteration 76: tolerance = .00001274
Iteration 77: tolerance = .00001151
Iteration 78: tolerance = .00001041
Iteration 79: tolerance = 9.406e-06
Iteration 80: tolerance = 8.501e-06
Iteration 81: tolerance = 7.683e-06
Iteration 82: tolerance = 6.943e-06
Iteration 83: tolerance = 6.274e-06
Iteration 84: tolerance = 5.669e-06
Iteration 85: tolerance = 5.122e-06
Iteration 86: tolerance = 4.628e-06
```

```
Iteration 87: tolerance = 4.182e-06
Iteration 88: tolerance = 3.778e-06
Iteration 89: tolerance = 3.413e-06
Iteration 90: tolerance = 3.084e-06
Iteration 91: tolerance = 2.786e-06
Iteration 92: tolerance = 2.517e-06
Iteration 93: tolerance = 2.274e-06
Iteration 94: tolerance = 2.054e-06
Iteration 95: tolerance = 1.855e-06
Iteration 96: tolerance = 1.676e-06
Iteration 97: tolerance = 1.514e-06
Iteration 98: tolerance = 1.368e-06
Iteration 99: tolerance = 1.235e-06
Iteration 100: tolerance = 1.116e-06
Iteration 101: tolerance = 1.008e-06
Iteration 102: tolerance = 9.105e-07
Iteration 103: tolerance = 8.224e-07
Iteration 104: tolerance = 7.428e-07
Iteration 105: tolerance = 6.710e-07
Iteration 106: tolerance = 6.060e-07
Iteration 107: tolerance = 5.474e-07
Iteration 108: tolerance = 4.944e-07
Iteration 109: tolerance = 4.466e-07
Iteration 110: tolerance = 4.034e-07
Iteration 111: tolerance = 3.643e-07
Iteration 112: tolerance = 3.291e-07
Iteration 113: tolerance = 2.972e-07
Iteration 114: tolerance = 2.684e-07
Iteration 115: tolerance = 2.425e-07
Iteration 116: tolerance = 2.190e-07
Iteration 117: tolerance = 1.978e-07
Iteration 118: tolerance = 1.786e-07
Iteration 119: tolerance = 1.613e-07
Iteration 120: tolerance = 1.457e-07
Iteration 121: tolerance = 1.316e-07
Iteration 122: tolerance = 1.189e-07
Iteration 123: tolerance = 1.074e-07
Iteration 124: tolerance = 9.697e-08
```

a.)

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

```
7 . est store hetero

8 . 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

```
9 . est store pgls

10 . local df = e(N_g) - 1

12 . lrtest hetero, df(`df')

Likelihood-ratio test                          LR chi2(254) =     619.86
(Assumption: pgls nested in hetero)            Prob > chi2  =     0.0000

13 . 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
```

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_cons	-.0107965	.0860341	-0.13	0.900	-.1794201	.1578272

14 . xtreg y x1 x2 x3 x4 x5 x6 x7, fe → fixed effects

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

R-sq:
within = **0.3772**
between = **0.1103**
overall = **0.1644**

corr(u_i, Xb) = **-0.2003**

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

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

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)				

Fixed effect test

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

15 . est store fixed

16 . xtreg y x1 x2 x3 x4 x5 x6 x7, re random effects reject H_0 → FE more

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

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

corr(u_i, X) = **0** (assumed)

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

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

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)				

17 . est store re

18 . hausman fixed re

	(b) fixed	(B) re	(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)

reject H_0

19 . log close
name: <unnamed>
log: C:\Users\com\Downloads\assign 7.smcl
log type: smcl
closed on: 17 Mar 2021, 21:20:30

According to fixed effect test, fixed effect exists. And with Hausman test we reject H_0. So fixed effect model is more appropriate