



Special Edition

(R)

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Notes:

1. Unicode is supported; see [help unicode advice](#).
2. Maximum number of variables is set to 5000; see [help set_maxvar](#).

```
. doedit "C:\Users\pcg180000\Documents\BUAN 6312.004\Project\Project-Guns.do"

. do "C:\Users\PCG180~1\AppData\Local\Temp\16\STD3184_000000.tmp"

. clear all

. set more off

. use "C:\Users\pcg180000\Documents\BUAN 6312.004\Project\guns.dta", clear

. xtset stateid year
    panel variable:  stateid (strongly balanced)
    time variable:   year, 77 to 99
                   delta: 1 unit

.

. gen lnvio = ln(vio)

. reg lnvio i.shall incarc_rate avginc density pop pbl064 pw1064 pm1029
```

Source	SS	df	MS	Number of obs	=	1,173
Model	275.712977	8	34.4641221	F(8, 1164)	=	188.41
Residual	212.918581	1,164	.182919743	Prob > F	=	0.0000
				R-squared	=	0.5643
				Adj R-squared	=	0.5613
Total	488.631558	1,172	.416921125	Root MSE	=	.42769

lnvio	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
1.shall	-.3683869	.0325674	-11.31	0.000	-.4322844	-.3044895
incarc_rate	.0016126	.0001072	15.05	0.000	.0014024	.0018229
avginc	.0012051	.0077802	0.15	0.877	-.0140597	.01647
density	.0266885	.013168	2.03	0.043	.0008527	.0525242
pop	.0427098	.0025588	16.69	0.000	.0376894	.0477303
pbl064	.0808526	.0166514	4.86	0.000	.0481825	.1135227
pw1064	.0312005	.0083776	3.72	0.000	.0147636	.0476374
pm1029	.0088709	.0107737	0.82	0.410	-.0122671	.0300089
_cons	2.981738	.5433938	5.49	0.000	1.915598	4.047879

```
. estat imtest, white
```

White's test for Ho: homoskedasticity
against Ha: unrestricted heteroskedasticity

```
chi2(43)      =    454.02
Prob > chi2    =    0.0000
```

Cameron & Trivedi's decomposition of IM-test

Source	chi2	df	p
Heteroskedasticity	454.02	43	0.0000
Skewness	107.86	8	0.0000
Kurtosis	4.22	1	0.0399
Total	566.10	52	0.0000

```
. reg lnvio i.shall incarc_rate avginc density pop pb1064 pw1064 pm1029, vce(robust)
```

```
Linear regression              Number of obs    =    1,173
                               F(8, 1164)        =    95.67
                               Prob > F          =    0.0000
                               R-squared          =    0.5643
                               Root MSE       =    .42769
```

lnvio	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
1.shall	-.3683869	.0347879	-10.59	0.000	-.436641	-.3001329
incarc_rate	.0016126	.0001807	8.92	0.000	.0012581	.0019672
avginc	.0012051	.0072778	0.17	0.869	-.013074	.0154842
density	.0266885	.0143494	1.86	0.063	-.0014651	.054842
pop	.0427098	.0031466	13.57	0.000	.0365361	.0488836
pb1064	.0808526	.0199924	4.04	0.000	.0416274	.1200778
pw1064	.0312005	.0097271	3.21	0.001	.012116	.0502851
pm1029	.0088709	.0120604	0.74	0.462	-.0147917	.0325334
_cons	2.981738	.6090198	4.90	0.000	1.786839	4.176638

```
. reg lnvio i.shall incarc_rate avginc density pop pb1064 pw1064 pm1029, vce(cluster stateid)
```

```
Linear regression              Number of obs    =    1,173
                               F(8, 50)         =    62.13
                               Prob > F          =    0.0000
                               R-squared          =    0.5643
                               Root MSE       =    .42769
```

(Std. Err. adjusted for **51** clusters in stateid)

lnvio	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
1.shall	-.3683869	.113937	-3.23	0.002	-.5972361	-.1395378
incarc_rate	.0016126	.0005999	2.69	0.010	.0004076	.0028177
avginc	.0012051	.0240808	0.05	0.960	-.0471626	.0495728
density	.0266885	.0414909	0.64	0.523	-.0566485	.1100255
pop	.0427098	.011729	3.64	0.001	.0191515	.0662681
pb1064	.0808526	.0713875	1.13	0.263	-.0625334	.2242386
pw1064	.0312005	.03409	0.92	0.364	-.0372713	.0996723
pm1029	.0088709	.0340964	0.26	0.796	-.0596137	.0773554
_cons	2.981738	2.166513	1.38	0.175	-1.369831	7.333307

```

. xtreg lnvio i.shall incarc_rate avginc density pop pbl064 pw1064 pm1029, fe

Fixed-effects (within) regression               Number of obs   =       1,173
Group variable: stateid                       Number of groups =        51

R-sq:                                           Obs per group:
    within = 0.2178                             min =          23
    between = 0.0033                            avg =         23.0
    overall = 0.0001                             max =          23

corr(u_i, Xb)  = -0.3687                        F(8,1114)       =       38.77
                                           Prob > F        =       0.0000

```

lnvio	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
1.shall	-.0461415	.0188668	-2.45	0.015	-.08316	-.009123
incarc_rate	-.000071	.0000936	-0.76	0.448	-.0002547	.0001126
avginc	-.0092037	.0059083	-1.56	0.120	-.0207963	.0023889
density	-.1722901	.0850362	-2.03	0.043	-.3391392	-.0054409
pop	.0115247	.0087239	1.32	0.187	-.0055924	.0286417
pbl064	.1042804	.0177564	5.87	0.000	.0694407	.1391201
pw1064	.0408611	.0050745	8.05	0.000	.0309044	.0508177
pm1029	-.0502725	.0064037	-7.85	0.000	-.0628373	-.0377078
_cons	3.866017	.3847716	10.05	0.000	3.111058	4.620975
sigma_u	.68024951					
sigma_e	.16072287					
rho	.94712779	(fraction of variance due to u_i)				

F test that all u_i=0: F(50, 1114) = **142.57** Prob > F = **0.0000**

```

. estimates store fe_vio

```

```

. xtreg lnvio i.shall incarc_rate avginc density pop pbl064 pw1064 pm1029, re

Random-effects GLS regression               Number of obs   =       1,173
Group variable: stateid                       Number of groups =        51

R-sq:                                           Obs per group:
    within = 0.2044                             min =          23
    between = 0.4908                            avg =         23.0
    overall = 0.4591                             max =          23

corr(u_i, X)  = 0 (assumed)                      Wald chi2(8)    =       337.19
                                           Prob > chi2     =       0.0000

```

lnvio	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
1.shall	-.069609	.0190835	-3.65	0.000	-.107012	-.032206
incarc_rate	.0001888	.0000687	2.75	0.006	.0000541	.0003235
avginc	-.0105112	.0058749	-1.79	0.074	-.0220258	.0010034
density	.0661588	.037363	1.77	0.077	-.0070713	.1393889
pop	.0225755	.0063498	3.56	0.000	.0101301	.035021
pbl064	.1067022	.0132976	8.02	0.000	.0806394	.1327649
pw1064	.0400716	.0050987	7.86	0.000	.0300783	.050065
pm1029	-.0375292	.0060462	-6.21	0.000	-.0493794	-.0256789
_cons	3.525463	.3874011	9.10	0.000	2.766171	4.284755
sigma_u	.33790775					
sigma_e	.16072287					
rho	.81550462	(fraction of variance due to u_i)				

. hausman fe vio re vio

	Coefficients			
	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
	fe_vio	re_vio	Difference	S.E.
1.shall	-.0461415	-.069609	.0234675	.
incarc_rate	-.000071	.0001888	-.0002598	.0000635
avginc	-.0092037	-.0105112	.0013075	.0006269
density	-.1722901	.0661588	-.2384489	.0763882
pop	.0115247	.0225755	-.0110508	.0059821
pb1064	.1042804	.1067022	-.0024217	.011767
pw1064	.0408611	.0400716	.0007895	.
pm1029	-.0502725	-.0375292	-.0127434	.0021099

b = consistent under H_0 and H_a ; obtained from xtreg
B = inconsistent under H_a , efficient under H_0 ; obtained from xtreg

Test: H_0 : difference in coefficients not systematic

```
chi2(8) = (b-B)'[(V_b-V_B)^(-1)](b-B)
        = 31.86
Prob>chi2 = 0.0001
(V b-V B is not positive definite)
```

```
. xtreg lnvio i.shall incarc rate avginc density pop pb1064 pw1064 pm1029, fe cluster(stateid)
```

```
Fixed-effects (within) regression      Number of obs   =      1,173
Group variable: stateid              Number of groups =       51
```

R-sq:		Obs per group:	
within	= 0.2178	min	= 23
between	= 0.0033	avg	= 23.0
overall	= 0.0001	max	= 23

		F(8, 50)	=	34.10
corr(u i, Xb)	= -0.3687	Prob > F	=	0.0000

(Std. Err. adjusted for **51** clusters in stateid)

lnvio	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
1.shall	-.0461415	.0417616	-1.10	0.275	-.1300223	.0377392
incarc_rate	-.000071	.0002504	-0.28	0.778	-.0005739	.0004318
avginc	-.0092037	.0129649	-0.71	0.481	-.0352445	.016837
density	-.1722901	.1376129	-1.25	0.216	-.4486936	.1041135
pop	.0115247	.014224	0.81	0.422	-.0170452	.0400945
pb1064	.1042804	.0326849	3.19	0.002	.0386308	.1699301
pw1064	.0408611	.0134585	3.04	0.004	.0138289	.0678932
pml029	-.0502725	.0206949	-2.43	0.019	-.0918394	-.0087057
_cons	3.866017	.7701057	5.02	0.000	2.319214	5.412819
sigma_u	.68024951					
sigma_e	.16072287					
rho	.94712779	(fraction of variance due to u_i)				

```
. xtreg lnvio i.shall incarc_rate avginc density pop pb1064 pw1064 pm1029, re cluster(stateid)
```

```
Random-effects GLS regression                Number of obs    =      1,173
Group variable: stateid                    Number of groups  =       51
```

```
R-sq:                                     Obs per group:
    within = 0.2044                               min =      23
    between = 0.4908                              avg =     23.0
    overall = 0.4591                              max =      23
```

```
corr(u_i, X)    = 0 (assumed)                Wald chi2(8)      =     167.14
                                                Prob > chi2       =      0.0000
```

(Std. Err. adjusted for **51** clusters in stateid)

lnvio	Coef.	Robust Std. Err.	z	P> z	[95% Conf. Interval]	
1.shall	-.069609	.038845	-1.79	0.073	-.1457438	.0065258
incarc_rate	.0001888	.0001877	1.01	0.314	-.0001791	.0005567
avginc	-.0105112	.0117802	-0.89	0.372	-.0335999	.0125775
density	.0661588	.0437925	1.51	0.131	-.0196729	.1519905
pop	.0225755	.0116369	1.94	0.052	-.0002323	.0453833
pb1064	.1067022	.0270973	3.94	0.000	.0535924	.1598119
pw1064	.0400716	.0127282	3.15	0.002	.0151248	.0650184
pm1029	-.0375292	.0180436	-2.08	0.038	-.072894	-.0021643
_cons	3.525463	.7786851	4.53	0.000	1.999268	5.051658
sigma_u	.33790775					
sigma_e	.16072287					
rho	.81550462	(fraction of variance due to u_i)				

```
. xtreg lnvio i.shall incarc_rate avginc density pop pb1064 pw1064 pm1029 i.year, fe cluster(stateid)
```

```
Fixed-effects (within) regression          Number of obs    =      1,173
Group variable: stateid                    Number of groups  =       51
```

```
R-sq:                                     Obs per group:
    within = 0.4180                               min =      23
    between = 0.0419                              avg =     23.0
    overall = 0.0009                              max =      23
```

```
corr(u_i, Xb)   = -0.2929                    F(30,50)         =     56.86
                                                Prob > F         =      0.0000
```

(Std. Err. adjusted for **51** clusters in stateid)

lnvio	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
1.shall	-.0279935	.0407168	-0.69	0.495	-.1097757	.0537886
incarc_rate	.000076	.0002079	0.37	0.716	-.0003416	.0004935
avginc	.0009587	.0164931	0.06	0.954	-.0321688	.0340861
density	-.091555	.1238622	-0.74	0.463	-.3403396	.1572296
pop	-.0047544	.0152294	-0.31	0.756	-.0353436	.0258347
pb1064	.0291862	.0495407	0.59	0.558	-.0703192	.1286916
pw1064	.0092501	.0237564	0.39	0.699	-.0384659	.0569662
pm1029	.0733254	.0524733	1.40	0.168	-.0320704	.1787211
year						
78	.0585261	.0161556	3.62	0.001	.0260767	.0909755
79	.1639486	.0244579	6.70	0.000	.1148233	.2130738
80	.2170759	.0334184	6.50	0.000	.1499531	.2841987
81	.2172551	.0391956	5.54	0.000	.1385284	.2959819
82	.1946328	.0465743	4.18	0.000	.1010856	.28818
83	.158645	.0593845	2.67	0.010	.0393676	.2779223

84	.1929883	.0770021	2.51	0.015	.0383251	.3476515
85	.2444764	.0922217	2.65	0.011	.0592438	.4297091
86	.3240904	.1089181	2.98	0.004	.1053219	.5428589
87	.324365	.1249881	2.60	0.012	.073319	.5754111
88	.3867412	.1397074	2.77	0.008	.1061305	.6673518
89	.4422143	.1535358	2.88	0.006	.1338286	.7505999
90	.5430478	.1960859	2.77	0.008	.1491976	.936898
91	.5959456	.2040685	2.92	0.005	.1860618	1.005829
92	.6275171	.2170306	2.89	0.006	.1915982	1.063436
93	.6497414	.2246177	2.89	0.006	.1985834	1.100899
94	.6354187	.2332437	2.72	0.009	.1669349	1.103903
95	.6276831	.2423607	2.59	0.013	.1408874	1.114479
96	.5713423	.2534067	2.25	0.029	.06236	1.080325
97	.5501153	.2613516	2.10	0.040	.0251751	1.075055
98	.4932904	.2746546	1.80	0.079	-.0583697	1.04495
99	.4328776	.2862197	1.51	0.137	-.1420117	1.007767
_cons	3.765525	1.152108	3.27	0.002	1.451448	6.079603
sigma_u	.6663043					
sigma_e	.1400264					
rho	.95770338	(fraction of variance due to u_i)				

```
. testparm i.year
```

```
( 1) 78.year = 0
( 2) 79.year = 0
( 3) 80.year = 0
( 4) 81.year = 0
( 5) 82.year = 0
( 6) 83.year = 0
( 7) 84.year = 0
( 8) 85.year = 0
( 9) 86.year = 0
(10) 87.year = 0
(11) 88.year = 0
(12) 89.year = 0
(13) 90.year = 0
(14) 91.year = 0
(15) 92.year = 0
(16) 93.year = 0
(17) 94.year = 0
(18) 95.year = 0
(19) 96.year = 0
(20) 97.year = 0
(21) 98.year = 0
(22) 99.year = 0
```

```
F( 22, 50) = 21.62
Prob > F = 0.0000
```

```
.
. gen lnrob = ln(rob)
```

```
. reg lnrob i.shall incarc_rate avginc density pop pb1064 pw1064 pm1029
```

Source	SS	df	MS	Number of obs	=	1,173
Model	636.767797	8	79.5959747	F(8, 1164)	=	214.83
Residual	431.265325	1,164	.370502857	Prob > F	=	0.0000
				R-squared	=	0.5962
				Adj R-squared	=	0.5934
Total	1068.03312	1,172	.91129106	Root MSE	=	.60869

lnrob	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
1.shall	-.5288202	.0463499	-11.41	0.000	-.619759	-.4378815
incarc_rate	.0010057	.0001525	6.59	0.000	.0007065	.0013049
avginc	.0407325	.0110728	3.68	0.000	.0190076	.0624574
density	.0905048	.0187407	4.83	0.000	.0537353	.1272742
pop	.0778176	.0036417	21.37	0.000	.0706726	.0849627
pb1064	.1021881	.0236982	4.31	0.000	.0556921	.1486841
pw1064	.0275209	.011923	2.31	0.021	.0041279	.0509138
pm1029	.0272565	.0153331	1.78	0.076	-.0028271	.05734
_cons	.9041383	.7733572	1.17	0.243	-.6131918	2.421468

```
. estat imtest, white
```

White's test for Ho: homoskedasticity
against Ha: unrestricted heteroskedasticity

```
chi2(43)      =    468.81
Prob > chi2    =    0.0000
```

Cameron & Trivedi's decomposition of IM-test

Source	chi2	df	p
Heteroskedasticity	468.81	43	0.0000
Skewness	87.38	8	0.0000
Kurtosis	2.34	1	0.1259
Total	558.53	52	0.0000

```
. reg lnrob i.shall incarc_rate avginc density pop pb1064 pw1064 pm1029, vce(robust)
```

Linear regression	Number of obs	=	1,173
	F(8, 1164)	=	144.90
	Prob > F	=	0.0000
	R-squared	=	0.5962
	Root MSE	=	.60869

lnrob	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
1.shall	-.5288202	.0510021	-10.37	0.000	-.6288865	-.4287539
incarc_rate	.0010057	.0001869	5.38	0.000	.0006391	.0013724
avginc	.0407325	.0092722	4.39	0.000	.0225404	.0589246
density	.0905048	.0153545	5.89	0.000	.0603792	.1206303
pop	.0778176	.0054853	14.19	0.000	.0670554	.0885799
pb1064	.1021881	.0265948	3.84	0.000	.0500091	.1543672
pw1064	.0275209	.0135419	2.03	0.042	.0009515	.0540902
pm1029	.0272565	.0149995	1.82	0.069	-.0021726	.0566856
_cons	.9041383	.8893029	1.02	0.310	-.8406777	2.648954

```
. reg lnrob i.shall incarc_rate avginc density pop pbl064 pw1064 pm1029, vce(cluster stateid)
```

Linear regression	Number of obs	=	1,173
	F(8, 50)	=	27.22
	Prob > F	=	0.0000
	R-squared	=	0.5962
	Root MSE	=	.60869

(Std. Err. adjusted for 51 clusters in stateid)

lnrob	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
1.shall	-.5288202	.1608765	-3.29	0.002	-.8519501	-.2056903
incarc_rate	.0010057	.0006401	1.57	0.122	-.0002799	.0022914
avginc	.0407325	.0281568	1.45	0.154	-.015822	.097287
density	.0905048	.0459796	1.97	0.055	-.001848	.1828576
pop	.0778176	.0225194	3.46	0.001	.0325862	.1230491
pbl064	.1021881	.0894076	1.14	0.259	-.0773923	.2817686
pw1064	.0275209	.0450088	0.61	0.544	-.062882	.1179237
pm1029	.0272565	.0417254	0.65	0.517	-.0565515	.1110645
_cons	.9041383	3.0615	0.30	0.769	-5.245065	7.053341

```
. xtreg lnrob i.shall incarc_rate avginc density pop pbl064 pw1064 pm1029, fe
```

Fixed-effects (within) regression	Number of obs	=	1,173
Group variable: stateid	Number of groups	=	51

R-sq:	Obs per group:
within = 0.0366	min = 23
between = 0.0531	avg = 23.0
overall = 0.0521	max = 23

	F(8,1114)	=	5.29
corr(u_i, Xb) = -0.0859	Prob > F	=	0.0000

lnrob	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
1.shall	-.0078189	.0252557	-0.31	0.757	-.0573731	.0417352
incarc_rate	-.0000763	.0001253	-0.61	0.542	-.0003222	.0001695
avginc	-.0175195	.007909	-2.22	0.027	-.0330377	-.0020012
density	-.1860917	.1138322	-1.63	0.102	-.4094413	.037258
pop	.0163332	.0116781	1.40	0.162	-.0065803	.0392466
pbl064	.1115421	.0237693	4.69	0.000	.0649045	.1581796
pw1064	.0271807	.0067929	4.00	0.000	.0138525	.040509
pm1029	.0111817	.0085722	1.30	0.192	-.0056378	.0280012
_cons	2.445723	.5150678	4.75	0.000	1.435111	3.456335
sigma_u	.9174441					
sigma_e	.21514885					
rho	.94787229	(fraction of variance due to u_i)				

F test that all u_i=0: F(50, 1114) = 164.06 Prob > F = 0.0000


```
. xtreg lnrob i.shall incarc rate avginc density pop pb1064 pw1064 pm1029, re
```

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

```
Number of obs      =    1,173
Number of groups   =     51
```

R-sq:

Obs per group:

```
within    = 0.0269
between   = 0.5183
overall   = 0.4910
```

```
min =      23
avg =     23.0
max =      23
```

$$\text{corr}(u_i, X) = 0 \text{ (assumed)}$$

```
Wald chi2(8)          =      99.59
Prob > chi2           =      0.0000
```

lnrob	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
1.shall	-.0411192	.0255899	-1.61	0.108	-.0912745	.0090362
incarc_rate	.0001735	.0000931	1.86	0.062	-9.02e-06	.000356
avginc	-.0152975	.0078914	-1.94	0.053	-.0307643	.0001693
density	.0997518	.0527672	1.89	0.059	-.0036699	.2031735
pop	.0405861	.0087624	4.63	0.000	.0234121	.05776
pb1064	.1074485	.0181757	5.91	0.000	.0718247	.1430723
pw1064	.0282639	.0068389	4.13	0.000	.0148598	.041668
pm1029	.0252997	.0081299	3.11	0.002	.0093654	.041234
_cons	1.8759	.52089	3.60	0.000	.8549742	2.896826
sigma_u	.48469008					
sigma_e	.21514885					
rho	.83539542	(fraction of variance due to u_i)				

```
. estimates store re rob
```

```
. hausman fe rob re rob
```

	Coefficients			
	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
	fe_rob	re_rob	Difference	S.E.
1.shall	-.0078189	-.0411192	.0333002	.
incarc_rate	-.0000763	.0001735	-.0002498	.0000838
avginc	-.0175195	-.0152975	-.002222	.0005277
density	-.1860917	.0997518	-.2858435	.1008633
pop	.0163332	.0405861	-.0242529	.00772
pb1064	.1115421	.1074485	.0040936	.0153173
pw1064	.0271807	.0282639	-.0010832	.
pm1029	.0111817	.0252997	-.014118	.002718

b = consistent under H_0 and H_a ; obtained from xtreg
B = inconsistent under H_a , efficient under H_0 ; obtained from xtreg

Test: Ho: difference in coefficients not systematic

```
chi2(8) = (b-B)'[(V_b-V_B)^(-1)](b-B)
        = 26.94
Prob>chi2 = 0.0007
(V b-V B is not positive definite)
```

```
. xtreg lnrob i.shall incarc_rate avginc density pop pbl064 pw1064 pm1029, fe cluster(stateid)
```

Fixed-effects (within) regression Number of obs = **1,173**
Group variable: **stateid** Number of groups = **51**

R-sq: Obs per group:

within = 0.0366	min = 23
between = 0.0531	avg = 23.0
overall = 0.0521	max = 23

corr(u_i, Xb) = **-0.0859** F(8,50) = **2.86**
 Prob > F = **0.0108**

(Std. Err. adjusted for **51** clusters in stateid)

lnrob	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
1.shall	-.0078189	.0551653	-0.14	0.888	-.1186217	.1029838
incarc_rate	-.0000763	.000321	-0.24	0.813	-.0007211	.0005685
avginc	-.0175195	.0220352	-0.80	0.430	-.0617784	.0267395
density	-.1860917	.1663413	-1.12	0.269	-.520198	.1480147
pop	.0163332	.0275874	0.59	0.556	-.0390778	.0717441
pbl064	.1115421	.0511546	2.18	0.034	.008795	.2142891
pw1064	.0271807	.0164344	1.65	0.104	-.0058286	.0601901
pm1029	.0111817	.0290976	0.38	0.702	-.0472626	.069626
_cons	2.445723	1.012584	2.42	0.019	.4118887	4.479557
sigma_u	.9174441					
sigma_e	.21514885					
rho	.94787229	(fraction of variance due to u_i)				

```
. xtreg lnrob i.shall incarc_rate avginc density pop pbl064 pw1064 pm1029, re cluster(stateid)
```

Random-effects GLS regression Number of obs = **1,173**
Group variable: **stateid** Number of groups = **51**

R-sq: Obs per group:

within = 0.0269	min = 23
between = 0.5183	avg = 23.0
overall = 0.4910	max = 23

corr(u_i, X) = **0** (assumed) Wald chi2(8) = **83.85**
 Prob > chi2 = **0.0000**

(Std. Err. adjusted for **51** clusters in stateid)

lnrob	Coef.	Robust Std. Err.	z	P> z	[95% Conf. Interval]	
1.shall	-.0411192	.0529293	-0.78	0.437	-.1448586	.0626203
incarc_rate	.0001735	.0002507	0.69	0.489	-.0003179	.0006649
avginc	-.0152975	.0199351	-0.77	0.443	-.0543697	.0237747
density	.0997518	.0479974	2.08	0.038	.0056786	.1938251
pop	.0405861	.0244303	1.66	0.097	-.0072964	.0884686
pbl064	.1074485	.0337729	3.18	0.001	.0412548	.1736422
pw1064	.0282639	.0162546	1.74	0.082	-.0035945	.0601223
pm1029	.0252997	.0259436	0.98	0.329	-.0255489	.0761483
_cons	1.8759	1.025224	1.83	0.067	-.1335014	3.885301
sigma_u	.48469008					
sigma_e	.21514885					
rho	.83539542	(fraction of variance due to u_i)				

```
. xtreg lnrob i.shall incarc_rate avginc density pop pbl064 pw1064 pm1029 i.year, fe cluster(stateid)
```

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

Number of obs = **1,173**
Number of groups = **51**

R-sq:

within = **0.2359**
between = **0.1358**
overall = **0.1362**

Obs per group:

min = **23**
avg = **23.0**
max = **23**

corr(u_i, Xb) = **0.1441**

F(30,50) = **40.77**
Prob > F = **0.0000**

(Std. Err. adjusted for **51** clusters in stateid)

lnrob	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
1.shall	.0268298	.0521753	0.51	0.609	-.0779673	.1316269
incarc_rate	.0000314	.0003477	0.09	0.928	-.000667	.0007297
avginc	.0143569	.0247676	0.58	0.565	-.0353903	.064104
density	-.0447449	.1982135	-0.23	0.822	-.4428684	.3533786
pop	.0000164	.0259374	0.00	0.999	-.0520805	.0521133
pbl064	.0141078	.0840609	0.17	0.867	-.1547335	.1829491
pw1064	-.0128322	.0327626	-0.39	0.697	-.0786379	.0529734
pm1029	.1046049	.072997	1.43	0.158	-.0420138	.2512236
year						
78	.0328497	.0216897	1.51	0.136	-.0107154	.0764148
79	.1375917	.032117	4.28	0.000	.0730828	.2021006
80	.243408	.045464	5.35	0.000	.1520908	.3347251
81	.2737088	.0508793	5.38	0.000	.1715147	.375903
82	.21599	.0644109	3.35	0.002	.0866168	.3453632
83	.1208158	.0867066	1.39	0.170	-.0533395	.2949711
84	.078831	.1064308	0.74	0.462	-.1349416	.2926036
85	.1131495	.1272629	0.89	0.378	-.1424655	.3687645
86	.1895678	.1521449	1.25	0.219	-.1160242	.4951598
87	.1572151	.1688872	0.93	0.356	-.1820049	.496435
88	.1927596	.1878849	1.03	0.310	-.1846184	.5701376
89	.2487313	.2140573	1.16	0.251	-.1812154	.6786781
90	.3509806	.2668617	1.32	0.194	-.185027	.8869881
91	.4668537	.2791767	1.67	0.101	-.0938891	1.027596
92	.4633221	.2951262	1.57	0.123	-.1294562	1.0561
93	.4796983	.3082342	1.56	0.126	-.1394084	1.098805
94	.4943754	.3234124	1.53	0.133	-.1552175	1.143968
95	.4940171	.3338462	1.48	0.145	-.1765328	1.164567
96	.4341625	.3504351	1.24	0.221	-.2697072	1.138032
97	.3652393	.3581743	1.02	0.313	-.354175	1.084654
98	.2677144	.3690383	0.73	0.472	-.4735208	1.00895
99	.1894683	.3845414	0.49	0.624	-.5829059	.9618425
_cons	3.27912	1.676644	1.96	0.056	-.088518	6.646759
sigma_u	.88484023					
sigma_e	.19352746					
rho	.95434775	(fraction of variance due to u_i)				

```
. testparm i.year
```

```
( 1) 78.year = 0
( 2) 79.year = 0
( 3) 80.year = 0
( 4) 81.year = 0
( 5) 82.year = 0
( 6) 83.year = 0
( 7) 84.year = 0
( 8) 85.year = 0
( 9) 86.year = 0
(10) 87.year = 0
(11) 88.year = 0
(12) 89.year = 0
(13) 90.year = 0
(14) 91.year = 0
(15) 92.year = 0
(16) 93.year = 0
(17) 94.year = 0
(18) 95.year = 0
(19) 96.year = 0
(20) 97.year = 0
(21) 98.year = 0
(22) 99.year = 0
```

```
F( 22, 50) = 25.86
Prob > F = 0.0000
```

```
.
. gen lnmur = ln(mur)
```

```
. reg lnmur i.shall incarc_rate avginc density pop pb1064 pw1064 pm1029
```

Source	SS	df	MS	Number of obs	=	1,173
Model	351.342396	8	43.9177995	F(8, 1164)	=	223.66
Residual	228.559518	1,164	.196356974	Prob > F	=	0.0000
				R-squared	=	0.6059
				Adj R-squared	=	0.6032
Total	579.901914	1,172	.494796855	Root MSE	=	.44312

lnmur	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
1.shall	-.3131735	.0337424	-9.28	0.000	-.3793763	-.2469707
incarc_rate	.002097	.000111	18.89	0.000	.0018791	.0023148
avginc	-.0772578	.0080609	-9.58	0.000	-.0930733	-.0614422
density	.0396669	.0136431	2.91	0.004	.012899	.0664348
pop	.0416175	.0026511	15.70	0.000	.0364159	.0468191
pb1064	.1307641	.0172521	7.58	0.000	.0969153	.1646128
pw1064	.0470796	.0086798	5.42	0.000	.0300497	.0641094
pm1029	.0655308	.0111624	5.87	0.000	.0436301	.0874314
_cons	-2.485593	.5629989	-4.41	0.000	-3.5902	-1.380987

```
. estat imtest, white
```

```
White's test for Ho: homoskedasticity
against Ha: unrestricted heteroskedasticity
```

```
chi2(43) = 317.00
Prob > chi2 = 0.0000
```

```
Cameron & Trivedi's decomposition of IM-test
```

Source	chi2	df	p
Heteroskedasticity	317.00	43	0.0000
Skewness	30.72	8	0.0002
Kurtosis	3.82	1	0.0506
Total	351.55	52	0.0000

```
. reg lnmur i.shall incarc_rate avginc density pop pb1064 pw1064 pm1029, vce(robust)
```

```
Linear regression                                Number of obs    =      1,173
                                                F(8, 1164)       =      176.49
                                                Prob > F         =      0.0000
                                                R-squared        =      0.6059
                                                Root MSE        =      .44312
```

lnmur	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
1.shall	-.3131735	.0357019	-8.77	0.000	-.3832208	-.2431262
incarc_rate	.002097	.0001544	13.58	0.000	.0017941	.0023999
avginc	-.0772578	.0087513	-8.83	0.000	-.0944278	-.0600878
density	.0396669	.0117541	3.37	0.001	.0166054	.0627284
pop	.0416175	.0035077	11.86	0.000	.0347355	.0484995
pb1064	.1307641	.018782	6.96	0.000	.0939137	.1676145
pw1064	.0470796	.0090873	5.18	0.000	.0292502	.0649089
pm1029	.0655308	.0136782	4.79	0.000	.0386941	.0923674
_cons	-2.485593	.6149912	-4.04	0.000	-3.692209	-1.278978

```
. reg lnmur i.shall incarc_rate avginc density pop pb1064 pw1064 pm1029, vce(cluster stateid)
```

```
Linear regression                                Number of obs    =      1,173
                                                F(8, 50)        =      138.04
                                                Prob > F         =      0.0000
                                                R-squared        =      0.6059
                                                Root MSE        =      .44312
```

(Std. Err. adjusted for **51** clusters in stateid)

lnmur	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
1.shall	-.3131735	.0990416	-3.16	0.003	-.5121045	-.1142425
incarc_rate	.002097	.0004603	4.56	0.000	.0011723	.0030216
avginc	-.0772578	.027044	-2.86	0.006	-.1315773	-.0229382
density	.0396669	.039893	0.99	0.325	-.0404606	.1197944
pop	.0416175	.011926	3.49	0.001	.0176633	.0655717
pb1064	.1307641	.0611915	2.14	0.038	.0078573	.2536709
pw1064	.0470796	.0285914	1.65	0.106	-.0103479	.104507
pm1029	.0655308	.0361641	1.81	0.076	-.007107	.1381685
_cons	-2.485593	1.992083	-1.25	0.218	-6.486809	1.515622

```

. xtreg lnmur i.shall incarc_rate avginc density pop pbl064 pw1064 pm1029, fe

Fixed-effects (within) regression               Number of obs   =       1,173
Group variable: stateid                     Number of groups =        51

R-sq:                                         Obs per group:
    within = 0.1528                         min =           23
    between = 0.2221                       avg =          23.0
    overall = 0.1846                       max =           23

corr(u_i, Xb) = -0.8961                     F(8,1114)       =       25.12
                                         Prob > F        =       0.0000

```

lnmur	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
1.shall	-.06081	.0257579	-2.36	0.018	-.1113495	-.0102704
incarc_rate	-.00036	.0001278	-2.82	0.005	-.0006107	-.0001093
avginc	.0243114	.0080663	3.01	0.003	.0084846	.0401382
density	-.6707132	.1160957	-5.78	0.000	-.898504	-.4429224
pop	-.0257054	.0119103	-2.16	0.031	-.0490745	-.0023363
pbl064	.0307009	.0242419	1.27	0.206	-.0168641	.0782658
pw1064	.0103313	.006928	1.49	0.136	-.003262	.0239246
pm1029	.0392384	.0087427	4.49	0.000	.0220844	.0563923
_cons	.4600088	.5253095	0.88	0.381	-.5706989	1.490716
sigma_u	1.36035					
sigma_e	.21942693					
rho	.97464151	(fraction of variance due to u_i)				

F test that all u_i=0: F(50, 1114) = **72.66** Prob > F = **0.0000**

```
. estimates store fe_mur
```

```

. xtreg lnmur i.shall incarc_rate avginc density pop pbl064 pw1064 pm1029, re

Random-effects GLS regression               Number of obs   =       1,173
Group variable: stateid                     Number of groups =        51

R-sq:                                         Obs per group:
    within = 0.0813                         min =           23
    between = 0.4921                       avg =          23.0
    overall = 0.4381                       max =           23

corr(u_i, X) = 0 (assumed)                  Wald chi2(8)    =       169.92
                                         Prob > chi2     =       0.0000

```

lnmur	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
1.shall	-.1153705	.0268844	-4.29	0.000	-.1680629	-.062678
incarc_rate	.0004438	.0000925	4.80	0.000	.0002625	.000625
avginc	.0093982	.0081589	1.15	0.249	-.0065929	.0253893
density	.0163429	.0381659	0.43	0.669	-.0584609	.0911467
pop	.0029126	.0072821	0.40	0.689	-.01136	.0171851
pbl064	.0512656	.0168244	3.05	0.002	.0182903	.0842409
pw1064	.0069318	.0071688	0.97	0.334	-.0071188	.0209824
pm1029	.0734716	.0084037	8.74	0.000	.0570007	.0899426
_cons	-.3301384	.536504	-0.62	0.538	-1.381667	.7213902
sigma_u	.30755149					
sigma_e	.21942693					
rho	.66267693	(fraction of variance due to u_i)				

. hausman fe mur re mur

	Coefficients			
	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
	fe_mur	re_mur	Difference	S.E.
1.shall	-.06081	-.1153705	.0545605	.
incarc_rate	-.00036	.0004438	-.0008037	.0000882
avginc	.0243114	.0093982	.0149132	.
density	-.6707132	.0163429	-.6870561	.1096429
pop	-.0257054	.0029126	-.0286179	.0094248
pb1064	.0307009	.0512656	-0.0205648	.017453
pw1064	.0103313	.0069318	.0033995	.
pm1029	.0392384	.0734716	-.0342333	.0024109

b = consistent under H_0 and H_a ; obtained from xtreg
B = inconsistent under H_a , efficient under H_0 ; obtained from xtreg

Test: H_0 : difference in coefficients not systematic

```
chi2(8) = (b-B)'[(V_b-V_B)^(-1)](b-B)
        = 91.44
Prob>chi2 = 0.0000
(V b-V B is not positive definite)
```

```
. xtreg lnmur i.shall incarc rate avginc density pop pb1064 pw1064 pm1029, fe cluster(stateid)
```

```
Fixed-effects (within) regression      Number of obs   =      1,173
Group variable: stateid              Number of groups =       51
```

R-sq:		Obs per group:	
within	= 0.1528	min	= 23
between	= 0.2221	avg	= 23.0
overall	= 0.1846	max	= 23

		F(8, 50)	=	156.39
corr(u i, Xb)	= -0.8961	Prob > F	=	0.0000

(Std. Err. adjusted for 51 clusters in stateid)

lnmur	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
1.shall	-.06081	.0369632	-1.65	0.106	-.1350527	.0134327
incarc_rate	-.00036	.0004231	-0.85	0.399	-.0012099	.0004899
avginc	.0243114	.0156779	1.55	0.127	-.0071786	.0558013
density	-.6707132	.3957745	-1.69	0.096	-1.46565	.1242232
pop	-.0257054	.0203457	-1.26	0.212	-.0665709	.0151602
pb1064	.0307009	.0781245	0.39	0.696	-.1262169	.1876186
pw1064	.0103313	.0128776	0.80	0.426	-.0155341	.0361967
pm1029	.0392384	.0215964	1.82	0.075	-.0041394	.0826161
_cons	.4600088	.8425884	0.55	0.588	-1.23238	2.152397
sigma_u	1.36035					
sigma_e	.21942693					
rho	.97464151	(fraction of variance due to u_i)				

```
. xtreg lnmur i.shall incarc_rate avginc density pop pb1064 pw1064 pm1029, re cluster(stateid)
```

```
Random-effects GLS regression                Number of obs    =      1,173
Group variable: stateid                    Number of groups  =        51
```

```
R-sq:                                     Obs per group:
      within = 0.0813                               min =      23
      between = 0.4921                              avg =     23.0
      overall = 0.4381                              max =      23
```

```
corr(u_i, X)    = 0 (assumed)                Wald chi2(8)      =     277.18
                                           Prob > chi2       =     0.0000
```

(Std. Err. adjusted for **51** clusters in stateid)

lnmur	Coef.	Robust Std. Err.	z	P> z	[95% Conf. Interval]	
1.shall	-.1153705	.039896	-2.89	0.004	-.1935652	-.0371757
incarc_rate	.0004438	.0004395	1.01	0.313	-.0004176	.0013051
avginc	.0093982	.0149265	0.63	0.529	-.0198572	.0386535
density	.0163429	.067886	0.24	0.810	-.1167113	.1493971
pop	.0029126	.0114322	0.25	0.799	-.0194941	.0253193
pb1064	.0512656	.0376346	1.36	0.173	-.0224967	.125028
pw1064	.0069318	.0123563	0.56	0.575	-.0172861	.0311497
pm1029	.0734716	.0229191	3.21	0.001	.0285511	.1183922
_cons	-.3301384	.7279221	-0.45	0.650	-1.75684	1.096563
sigma_u	.30755149					
sigma_e	.21942693					
rho	.66267693	(fraction of variance due to u_i)				

```
. xtreg lnmur i.shall incarc_rate avginc density pop pb1064 pw1064 pm1029 i.year, fe cluster(stateid)
```

```
Fixed-effects (within) regression          Number of obs    =      1,173
Group variable: stateid                    Number of groups  =        51
```

```
R-sq:                                     Obs per group:
      within = 0.2905                               min =      23
      between = 0.1945                              avg =     23.0
      overall = 0.1413                              max =      23
```

```
corr(u_i, Xb)   = -0.8336                      F(30,50)         =     81.49
                                           Prob > F         =     0.0000
```

(Std. Err. adjusted for **51** clusters in stateid)

lnmur	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
1.shall	-.0149524	.0382403	-0.39	0.697	-.0917603	.0618556
incarc_rate	-.0001164	.0003631	-0.32	0.750	-.0008457	.0006129
avginc	.0566492	.0165554	3.42	0.001	.0233967	.0899017
density	-.5442635	.3192203	-1.70	0.094	-1.185436	.0969093
pop	-.0320769	.0209819	-1.53	0.133	-.0742202	.0100664
pb1064	.0219833	.0758151	0.29	0.773	-.1302958	.1742624
pw1064	-.0004893	.0201044	-0.02	0.981	-.0408701	.0398915
pm1029	.0691941	.0417945	1.66	0.104	-.0147526	.1531408
year						
78	-.0007195	.0322722	-0.02	0.982	-.0655401	.0641011
79	.0592481	.0311141	1.90	0.063	-.0032465	.1217427
80	.0901814	.041058	2.20	0.033	.0077139	.1726489
81	.1021543	.0510636	2.00	0.051	-.00041	.2047186
82	.0224098	.0581861	0.39	0.702	-.0944604	.1392799
83	-.0314385	.0640621	-0.49	0.626	-.1601111	.0972341

84	-.1359192	.071662	-1.90	0.064	-.2798565	.0080181
85	-.0866144	.0856965	-1.01	0.317	-.2587409	.0855122
86	-.0122752	.0927286	-0.13	0.895	-.1985262	.1739758
87	-.0290338	.0999408	-0.29	0.773	-.2297707	.1717032
88	-.0174594	.1196893	-0.15	0.885	-.2578626	.2229437
89	-.0145617	.1321034	-0.11	0.913	-.2798993	.2507759
90	.059998	.1649718	0.36	0.718	-.2713577	.3913537
91	.1053071	.1754909	0.60	0.551	-.2471767	.4577909
92	.0681002	.1828352	0.37	0.711	-.2991352	.4353355
93	.1544297	.1898113	0.81	0.420	-.2268176	.535677
94	.0442648	.1971908	0.22	0.823	-.3518047	.4403342
95	.0556601	.1989082	0.28	0.781	-.3438588	.455179
96	-.015709	.2125365	-0.07	0.941	-.4426011	.4111831
97	-.1221824	.2186706	-0.56	0.579	-.5613952	.3170304
98	-.1863381	.2332966	-0.80	0.428	-.6549281	.2822519
99	-.2554286	.2420434	-1.06	0.296	-.741587	.2307298
_cons	.1882653	1.056771	0.18	0.859	-1.934322	2.310853
sigma_u	1.1362086					
sigma_e	.20281999					
rho	.96911961	(fraction of variance due to u_i)				

. testparm i.year

```
( 1) 78.year = 0
( 2) 79.year = 0
( 3) 80.year = 0
( 4) 81.year = 0
( 5) 82.year = 0
( 6) 83.year = 0
( 7) 84.year = 0
( 8) 85.year = 0
( 9) 86.year = 0
(10) 87.year = 0
(11) 88.year = 0
(12) 89.year = 0
(13) 90.year = 0
(14) 91.year = 0
(15) 92.year = 0
(16) 93.year = 0
(17) 94.year = 0
(18) 95.year = 0
(19) 96.year = 0
(20) 97.year = 0
(21) 98.year = 0
(22) 99.year = 0
```

```
F( 22, 50) = 19.61
Prob > F = 0.0000
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end of do-file

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