```
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                                                  Statistics/Data analysis
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      __/  /  /  __/  /  /  __/       SE—Standard Edition
```

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Notes:
      1. Unicode is supported; see help unicode advice.
      2. Maximum number of variables is set to 5,000; see help set maxvar.

1 . use "B:\LAP_inst_reg_data.dta"

2 . destring user, g(user_)
  user: all characters numeric; user_ **generated** as **long**

3 . xtset user_

  Panel variable: **user_** (unbalanced)

4 . xtivreg Q DOS_t ppdays gt90 pmax tave tmin totalpp cdd rhave pp ET (P_ave = FC blockdiff1 blockdiff2 DOS), fe vce(robu
  note: **ET** omitted because of collinearity.
  note: **blockdiff2** omitted because of collinearity.

Fixed-effects (within) IV regression   Number of obs   =   202,507
Group variable: **user_**   Number of groups =   18,444

R-squared: Obs per group:
    Within = **0.5278**   min =   1
    Between = **0.5551**   avg =   11.0
    Overall = **0.3833**   max =   11

                                             Wald chi2(**11**)   =   1.81e+08
corr(u_i, Xb) = **0.2527**   Prob > chi2   =   0.0000

                         (Std. err. adjusted for **18,444** clusters in **user_**)
```

|            |             | Robust    |        |       |                      |            |
|------------|-------------|-----------|--------|-------|----------------------|------------|
| Q          | Coefficient | std. err. | z      | P>\|z\| | [95% conf. interval] |            |
| P_ave      | -.3798938   | .0376     | -10.10 | 0.000 | -.4535884            | -.3061992  |
| DOS_t      | .0257314    | .0021121  | 12.18  | 0.000 | .0215918             | .029871    |
| ppdays     | -.0206194   | .0004582  | -45.00 | 0.000 | -.0215174            | -.0197214  |
| gt90       | .0257972    | .0010338  | 24.95  | 0.000 | .0237711             | .0278233   |
| pmax       | .0770543    | .0032122  | 23.99  | 0.000 | .0707585             | .0833501   |
| tave       | .0151777    | .0026228  | 5.79   | 0.000 | .0100372             | .0203182   |
| tmin       | -.0016152   | .0033984  | -0.48  | 0.635 | -.0082759            | .0050455   |
| totalpp    | .0037699    | .0006277  | 6.01   | 0.000 | .0025396             | .0050003   |
| cdd        | -.0006718   | .0000312  | -21.55 | 0.000 | -.000733             | -.0006107  |
| rhave      | .027896     | .0014806  | 18.84  | 0.000 | .0249941             | .0307979   |
| pp         | 0           | (omitted) |        |       |                      |            |
| ET         | 0           | (omitted) |        |       |                      |            |
| _cons      | 1.926281    | .2798986  | 6.88   | 0.000 | 1.37769              | 2.474872   |

```
    sigma_u │  .55917503
    sigma_e │  .28873291
```

```
         rho │   .78950113    (fraction of variance due to u_i)
```

```
Instrumented: P_ave
 Instruments: DOS_t ppdays gt90 pmax tave tmin totalpp cdd rhave pp FC
              blockdiff1 DOS
```

5 . gen cluster1 = cluster + 1 if cluster == 0
   (181,944 missing values generated)

6 . gen cluster2 = cluster + 1 if cluster == 1
   (157,973 missing values generated)

7 . gen cluster3 = cluster + 1 if cluster == 2
   (177,223 missing values generated)

8 . gen cluster4 = cluster + 1 if cluster == 3
   (146,630 missing values generated)

9 . drop cluster1 cluster2 cluster3 cluster4

10 . gen cluster1 = 1 if cluster == 0
   (181,944 missing values generated)

11 . drop cluster1

12 . generate cluster1 = (cluster==0)

13 . gen cluster2 = (cluster==1)

14 . gen cluster3 = (cluster==2)

15 . gen cluster4 = (cluster==3)

16 . gen cluster5 = (cluster==4)

17 . sum cluster1

```
    Variable │        Obs        Mean    Std. dev.        Min         Max
─────────────┼─────────────────────────────────────────────────────────────
    cluster1 │    202,507    .1015422     .302046          0           1
```

18 . gen P_c1 = P_ave * cluster1

19 . gen P_c2 = P_ave * cluster2

20 . gen P_c3 = P_ave * cluster3

21 .
22 . gen P_c4 = P_ave * cluster4

23 . gen P_c5 = P_ave * cluster5

24 . xtivreg Q DOS_t ppdays gt90 pmax tave tmin totalpp cdd rhave pp ET (P_ave P_c1 P_c2 P_c3 P_c4 P_c5 = FC FC*cluster1 FC
   > ster4 FC*cluster5 DOS DOS*cluster1 DOS*cluster2 DOS*cluster3 DOS*cluster4 DOS*cluster5), fe vce(robust)
   variable FC*cluster1 not found
   r(111);

```
25 . gen FC_c1 = FC * cluster1

26 . gen FC_c2 = FC * cluster2

27 . gen FC_c3 = FC * cluster3

28 . gen FC_c4 = FC * cluster4

29 . gen FC_c5 = FC * cluster5

30 . gen DOS_c1 = DOS * cluster1

31 . gen DOS_c2 = DOS * cluster2

32 . gen DOS_c3 = DOS * cluster3

33 . gen DOS_c4 = DOS * cluster4

34 . gen DOS_c5 = DOS * cluster5

35 . xtivreg Q DOS_t ppdays gt90 pmax tave tmin totalpp cdd rhave pp ET (P_ave P_c1 P_c2 P_c3 P_c4 P_c5 = FC FC_c1 FC_c2 FC
   > OS_c2 DOS_c3 DOS_c4 DOS_c5), fe vce(robust)
   note: ET omitted because of collinearity.
   note: FC_c5 omitted because of collinearity.
   note: DOS_c5 omitted because of collinearity.
```

| Fixed-effects (within) IV regression | | | Number of obs | = | 202,507 |
| Group variable: **user_** | | | Number of groups | = | 18,444 |

R-squared:
    Within =   .
    Between = **0.2536**
    Overall = **0.0303**

Obs per group:
    min = 1
    avg = 11.0
    max = 11

Wald chi2(**16**)   =   **5.27e+07**
corr(u_i, Xb) = **-0.3215**   Prob > chi2   =   **0.0000**

(Std. err. adjusted for **18,444** clusters in **user_**)

Q	Coefficient	Robust std. err.	z	P>|z|	[95% conf. interval]	
P_ave	0	(omitted)				
P_c1	.2337209	.3575811	0.65	0.513	-.4671251	.934567
P_c2	.182262	.3854682	0.47	0.636	-.5732418	.9377657
P_c3	.2904899	.3589643	0.81	0.418	-.4130673	.994047
P_c4	.2181558	.3971218	0.55	0.583	-.5601887	.9965003
P_c5	.2099835	.3592105	0.58	0.559	-.4940561	.914023
DOS_t	.0229845	.0039214	5.86	0.000	.0152986	.0306704
ppdays	.0011884	.0136402	0.09	0.931	-.0255459	.0279228
gt90	.0321833	.0043489	7.40	0.000	.0236595	.040707
pmax	.0967265	.0140373	6.89	0.000	.0692139	.1242392
tave	-.0325789	.0304726	-1.07	0.285	-.092304	.0271463
tmin	.0625077	.0404698	1.54	0.122	-.0168116	.141827
totalpp	.0390979	.0219583	1.78	0.075	-.0039395	.0821353
cdd	-.0011547	.0003008	-3.84	0.000	-.0017443	-.0005651
rhave	.0108088	.0109646	0.99	0.324	-.0106814	.0322989
pp	-4.147462	2.587774	-1.60	0.109	-9.219406	.9244819
ET	0	(omitted)				
_cons	4.752643	1.807623	2.63	0.009	1.209768	8.295519
sigma_u	.696311					
sigma_e	.44794842					
rho	.70728548	(fraction of variance due to u_i)				

Instrumented: **P_ave P_c1 P_c2 P_c3 P_c4 P_c5**

Instruments: **DOS_t ppdays gt90 pmax tave tmin totalpp cdd rhave pp FC FC_c1**
            FC_c2 FC_c3 FC_c4 DOS DOS_c1 DOS_c2 DOS_c3 DOS_c4

36 . xtivreg Q DOS_t ppdays gt90 pmax tave tmin totalpp cdd rhave pp ET (P_ave P_c2 P_c3 P_c4 P_c5 = FC FC_c2 FC_c3 FC_c4 F
> 4 DOS_c5), fe vce(robust)
note: **ET** omitted because of collinearity.

Fixed-effects (within) IV regression   Number of obs   =   202,507
Group variable: **user_**   Number of groups =   18,444

R-squared: Obs per group:
    Within =   .   min =   1
    Between = 0.2536   avg =   11.0
    Overall = 0.0303   max =   11

                                            Wald chi2(**16**)   =   5.27e+07
corr(u_i, Xb) = -0.3215   Prob > chi2   =   0.0000

                    (Std. err. adjusted for **18,444** clusters in **user_**)

	Coefficient	Robust std. err.	z	P>|z|	[95% conf. interval]	
P_ave	.2337209	.3575811	0.65	0.513	-.4671251	.9345669
P_c2	-.051459	.0418466	-1.23	0.219	-.1334768	.0305588
P_c3	.0567689	.031638	1.79	0.073	-.0052404	.1187783
P_c4	-.0155652	.0488207	-0.32	0.750	-.111252	.0801216
P_c5	-.0237375	.0271376	-0.87	0.382	-.0769263	.0294513
DOS_t	.0229845	.0039214	5.86	0.000	.0152986	.0306704
ppdays	.0011884	.0136402	0.09	0.931	-.0255459	.0279228
gt90	.0321833	.0043489	7.40	0.000	.0236595	.040707
pmax	.0967265	.0140373	6.89	0.000	.0692139	.1242392
tave	-.0325789	.0304726	-1.07	0.285	-.092304	.0271463
tmin	.0625077	.0404698	1.54	0.122	-.0168116	.141827
totalpp	.0390979	.0219583	1.78	0.075	-.0039395	.0821353
cdd	-.0011547	.0003008	-3.84	0.000	-.0017443	-.0005651
rhave	.0108088	.0109646	0.99	0.324	-.0106814	.0322989
pp	-4.147462	2.587774	-1.60	0.109	-9.219406	.9244818
ET	0	(omitted)				
_cons	4.752643	1.807623	2.63	0.009	1.209768	8.295519

sigma_u	.696311					
sigma_e	.4479472					
rho	.70728661	(fraction of variance due to u_i)				

Instrumented: **P_ave P_c2 P_c3 P_c4 P_c5**
Instruments: **DOS_t ppdays gt90 pmax tave tmin totalpp cdd rhave pp FC FC_c2**
            FC_c3 FC_c4 FC_c5 DOS DOS_c2 DOS_c3 DOS_c4 DOS_c5

37 . ivreg P_ave DOS DOS_t ppdays gt90 pmax tave tmin totalpp rhave cdd pp ET, fe vce(robust)
option fe not allowed
r(198);

38 . xtreg P_ave DOS DOS_t ppdays gt90 pmax tave tmin totalpp rhave cdd pp ET, fe vce(robust)
note: **pp** omitted because of collinearity.
note: **ET** omitted because of collinearity.

Fixed-effects (within) regression   Number of obs   =   202,507
Group variable: **user_**   Number of groups =   18,444

R-squared: Obs per group:
    Within = 0.1932   min =   1
    Between = 0.0032   avg =   11.0
    Overall = 0.1446   max =   11

| | | | F(10,18443) | = | 2553.33 |
| corr(u_i, Xb) = 0.0003 | | | Prob > F | = | 0.0000 |

(Std. err. adjusted for **18,444** clusters in **user_**)

P_ave	Coefficient	Robust std. err.	t	P>|t|	[95% conf. interval]	
DOS	.0697937	.0033403	20.89	0.000	.0632463	.076341
DOS_t	.092438	.0029502	31.33	0.000	.0866553	.0982208
ppdays	.0061924	.0008372	7.40	0.000	.0045515	.0078334
gt90	.0032151	.0009007	3.57	0.000	.0014496	.0049806
pmax	-.0192191	.0063603	-3.02	0.003	-.0316859	-.0067523
tave	.0565057	.0016425	34.40	0.000	.0532862	.0597253
tmin	-.0647255	.0015814	-40.93	0.000	-.0678252	-.0616258
totalpp	.0101451	.0010579	9.59	0.000	.0080714	.0122187
rhave	.0250349	.0012787	19.58	0.000	.0225285	.0275414
cdd	-.0000225	.0000326	-0.69	0.491	-.0000863	.0000414
pp	0	(omitted)				
ET	0	(omitted)				
_cons	-14.94523	.3383839	-44.17	0.000	-15.60849	-14.28197
sigma_u	.26018024					
sigma_e	.38461141					
rho	.31394979	(fraction of variance due to u_i)				

```
39 . predict P_ave_hat
   (option xb assumed; fitted values)

40 . gen P_hc1 = P_ave_hat * cluster1

41 . gen P_hc1 = P_ave_hat * cluster2
   variable P_hc1 already defined
   r(110);

42 . gen P_hc2 = P_ave_hat * cluster2

43 . gen P_hc3 = P_ave_hat * cluster3

44 . gen P_hc4 = P_ave_hat * cluster4

45 . gen P_hc5 = P_ave_hat * cluster5

46 . P_ave DOS DOS_t FC blockdiff1 blockdiff2 ppdays gt90 pmax tave tmin totalpp rhave cdd pp ET, fe vce(robust)
   command P_ave is unrecognized
   r(199);

47 . xtreg P_ave DOS DOS_t FC blockdiff1 blockdiff2 ppdays gt90 pmax tave tmin totalpp rhave cdd pp ET, fe vce(robust)
   note: blockdiff1 omitted because of collinearity.
   note: blockdiff2 omitted because of collinearity.
   note: cdd omitted because of collinearity.
   note: pp omitted because of collinearity.
   note: ET omitted because of collinearity.
```

Fixed-effects (within) regression	Number of obs	=	202,507
Group variable: **user_**	Number of groups	=	18,444

R-squared:			Obs per group:		
Within	= 0.1932			min =	1
Between	= 0.0032			avg =	11.0
Overall	= 0.1446			max =	11

| | | F(10,18443) | = | 2553.33 |
| corr(u_i, Xb) = 0.0003 | | Prob > F | = | 0.0000 |

(Std. err. adjusted for **18,444** clusters in **user_**)

P_ave	Coefficient	Robust std. err.	t	P>|t|	[95% conf. interval]	
DOS	.069	.0028859	23.91	0.000	.0633433	.0746566
DOS_t	.092313	.0029527	31.26	0.000	.0865254	.0981005
FC	.0023431	.0034021	0.69	0.491	-.0043252	.0090115
blockdiff1	0	(omitted)				
blockdiff2	0	(omitted)				
ppdays	.0062327	.0008464	7.36	0.000	.0045738	.0078917
gt90	.0026251	.0009188	2.86	0.004	.0008242	.0044261
pmax	-.0175539	.0051603	-3.40	0.001	-.0276685	-.0074392
tave	.056522	.0016493	34.27	0.000	.0532893	.0597547
tmin	-.0648418	.0015746	-41.18	0.000	-.0679282	-.0617553
totalpp	.0099626	.0009206	10.82	0.000	.0081582	.011767
rhave	.0245232	.0011252	21.79	0.000	.0223177	.0267288
cdd	0	(omitted)				
pp	0	(omitted)				
ET	0	(omitted)				
_cons	-14.89557	.3047663	-48.88	0.000	-15.49294	-14.2982
sigma_u	.26018024					
sigma_e	.38461141					
rho	.31394979	(fraction of variance due to u_i)				

```
48 . predict Phat
   (option xb assumed; fitted values)

49 . gen Phat1 = Phat * cluster1

50 . gen Phat2 = Phat * cluster2

51 . gen Phat3 = Phat * cluster3

52 . gen Phat4 = Phat * cluster4

53 . gen Phat5 = Phat * cluster5

54 . xtreg Q Phat Phat2 Phat3 Phat4 Phat5 DOS_t ppdays gt90 pmax tave tmin totalpp rhave, fe vce(robust)
```

Fixed-effects (within) regression   Number of obs   =   202,507
Group variable: **user_**   Number of groups =   18,444

R-squared: Obs per group:
     Within = **0.1730**   min =   1
     Between = **0.0362**   avg =   11.0
     Overall = **0.0072**   max =   11

                                   F(**13,18443**)   =   1591.81
corr(u_i, Xb) = **-0.2234**   Prob > F   =   0.0000

(Std. err. adjusted for **18,444** clusters in **user_**)

Q	Coefficient	Robust std. err.	t	P>|t|	[95% conf. interval]	
Phat	-.8992717	.0427809	-21.02	0.000	-.9831264	-.8154171
Phat2	-.0794806	.022227	-3.58	0.000	-.1230476	-.0359136
Phat3	.0489029	.0235499	2.08	0.038	.002743	.0950628
Phat4	-.045525	.020525	-2.22	0.027	-.0857559	-.0052941
Phat5	-.0420856	.0203861	-2.06	0.039	-.0820443	-.0021269
DOS_t	.0756901	.0022614	33.47	0.000	.0712576	.0801226
ppdays	-.0186889	.0006145	-30.41	0.000	-.0198934	-.0174844
gt90	.0189547	.0011018	17.20	0.000	.016795	.0211144
pmax	.1505002	.0036182	41.60	0.000	.1434083	.1575922

tave	.0355584	.0029021	12.25	0.000	.0298699	.0412468
tmin	-.03916	.0035896	-10.91	0.000	-.046196	-.032124
totalpp	-.0054201	.0010037	-5.40	0.000	-.0073875	-.0034527
rhave	.0278043	.0019414	14.32	0.000	.023999	.0316096
_cons	-2.320098	.3082372	-7.53	0.000	-2.924272	-1.715925
sigma_u	.66385275					
sigma_e	.38213491					
rho	.75111602	(fraction of variance due to u_i)				

55 . xtreg Q Phat DOS_t ppdays gt90 pmax tave tmin totalpp rhave, fe vce(robust)

Fixed-effects (within) regression   Number of obs   =   202,507
Group variable: **user_**   Number of groups =   18,444

R-squared: Obs per group:
    Within = 0.1727   min =   1
    Between = 0.0009   avg =   11.0
    Overall = 0.0515   max =   11

                                           F(**9,18443**)   =   2270.79
corr(u_i, Xb) = **0.0001**   Prob > F   =   0.0000

                        (Std. err. adjusted for **18,444** clusters in **user_**)

Q	Coefficient	Robust std. err.	t	P>|t|	[95% conf. interval]	
Phat	-.9348665	.0391576	-23.87	0.000	-1.011619	-.858114
DOS_t	.0756905	.0022613	33.47	0.000	.0712581	.080123
ppdays	-.0186888	.0006145	-30.41	0.000	-.0198933	-.0174844
gt90	.0189543	.0011018	17.20	0.000	.0167946	.0211139
pmax	.1505031	.003618	41.60	0.000	.1434114	.1575948
tave	.035555	.002902	12.25	0.000	.0298668	.0412433
tmin	-.0391562	.0035895	-10.91	0.000	-.0461919	-.0321205
totalpp	-.005421	.0010037	-5.40	0.000	-.0073884	-.0034536
rhave	.0278026	.0019413	14.32	0.000	.0239974	.0316077
_cons	-2.319908	.3081922	-7.53	0.000	-2.923993	-1.715823
sigma_u	.62901677					
sigma_e	.38219947					
rho	.7303562	(fraction of variance due to u_i)				

56 . xtivreg Q DOS_t ppdays gt90 pmax tave tmin totalpp rhave (P_ave = DOS FC), fe vce(robust)

Fixed-effects (within) IV regression   Number of obs   =   202,507
Group variable: **user_**   Number of groups =   18,444

R-squared: Obs per group:
    Within = **0.6079**   min =   1
    Between = **0.5561**   avg =   11.0
    Overall = **0.4719**   max =   11

                                           Wald chi2(**9**)   = 116766.05
corr(u_i, Xb) = **0.2468**   Prob > chi2   =   0.0000

(Std. err. adjusted for **18,444** clusters in **user_**)

Q	Coefficient	Robust std. err.	z	P>|z|	[95% conf. interval]	
P_ave	-.9348672	.026774	-34.92	0.000	-.9873433	-.8823911
DOS_t	.0756906	.001511	50.09	0.000	.072729	.0786522
ppdays	-.0186888	.0003982	-46.93	0.000	-.0194694	-.0179083
gt90	.0189543	.0007675	24.70	0.000	.0174501	.0204585
pmax	.1505032	.0024786	60.72	0.000	.1456453	.1553612
tave	.035555	.0019806	17.95	0.000	.0316732	.0394369
tmin	-.0391562	.0024485	-15.99	0.000	-.0439551	-.0343573
totalpp	-.0054211	.0006799	-7.97	0.000	-.0067537	-.0040884
rhave	.0278026	.0013195	21.07	0.000	.0252165	.0303887
_cons	-2.319915	.2099278	-11.05	0.000	-2.731366	-1.908464
sigma_u	.47603398					
sigma_e	.26313265					
rho	.7659643	(fraction of variance due to u_i)				

Instrumented: **P_ave**
 Instruments: **DOS_t ppdays gt90 pmax tave tmin totalpp rhave DOS FC**

57 .