note: ET omitted because of collinearity.

Fixed-effects (within) regression

Group variable: user_

```
/__ / ____ (R
/__ / / ___/ / ___/
____/ Statistics/Data analysis
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17.0 SE-Standard Edition Statistics and Data Science Copyright 1985-2021 StataCorp LLC StataCorp 4905 Lakeway Drive College Station, Texas 77845 USA 800-STATA-PC https://www.stata.com 979-696-4600 stata@stata.com Stata license: 33-user network perpetual Serial number: 401706319498 Licensed to: Mason CHASS IT 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 . destring period, g(period_) period: all characters numeric; period_ generated as byte 4 . gen cluster1 = (cluster==0) 5 . gen cluster2 = (cluster==1) 6 . gen cluster3 = (cluster==2) 7 . gen cluster3 = (cluster==3) variable cluster3 already defined r(110);8 . gen cluster4 = (cluster==3) 9 . gen cluster5 = (cluster==4) 10 . save "B:\LAP_inst_reg_data_04.dta" file B:\LAP_inst_reg_data_04.dta saved 11 . xtreg P_ave FC blockdiff1 blockdiff2 DOS DOS_t ppdays gt90 pmax tave tmin totalpp cdd rhave pp ET, fe vce(robust) must specify panelvar; use xtset r(459);12 . xtset user Panel variable: user_ (unbalanced) 13 . xtreg P_ave FC blockdiff1 blockdiff2 DOS DOS t ppdays gt90 pmax tave tmin totalpp cdd rhave pp ET, fe vce(robust) note: blockdiff1 omitted because of collinearity. note: blockdiff2 omitted because of collinearity. note: rhave omitted because of collinearity. note: pp omitted because of collinearity.

Number of obs

Number of groups =

202,507

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]
FC	.1146393	.0058556	19.58	0.000	.1031619	.1261168
blockdiff1	.1146393		19.56	0.000	.1031613	.1201100
		(omitted)				
blockdiff2	0	(omitted)				
DOS	.0309626	.0041518	7.46	0.000	.0228248	.0391005
DOS_t	.0863199	.0031821	27.13	0.000	.0800827	.092557
ppdays	.008164	.000783	10.43	0.000	.0066293	.0096987
gt90	0256472	.0009232	-27.78	0.000	0274568	0238376
pmax	.0622514	.0072018	8.64	0.000	.0481352	.0763676
tave	.0573018	.0016696	34.32	0.000	.0540291	.0605744
tmin	0704156	.0017975	-39.17	0.000	0739389	0668923
totalpp	.0012168	.0008474	1.44	0.151	0004441	.0028778
cdd	.001076	.0000494	21.79	0.000	.0009792	.0011728
rhave	0	(omitted)		0.000	***************************************	***************************************
pp	0	(omitted)				
FT	0	(omitted)				
		.3840684	22 50	0.000	-13.26848	-11.76286
_cons	-12.51567	. 3840684	-32.59	0.000	-13.26848	-11./6286
sigma u	.26018024					
sigma_u						
sigma_e	.38461141				• • •	
rho	.31394979	(fraction	ot varia	nce due t	:o u_1)	

14 . xtreg P_ave FC DOS DOS_t ppdays gt90 pmax tave tmin totalpp cdd, fe vce(robust)

Fixed-effects (within) regression

Group variable: user_

R-squared:

Number of obs = 202,507

Number of groups = 18,444

Within = 0.1932 min = 1 Between = 0.0032 avg = 11.0 Overall = 0.1446 max = 11

		Robust				
P_ave	Coefficient	std. err.	t	P> t	[95% conf.	interval]
FC	.1146393	.0058556	19.58	0.000	.1031619	.1261168
DOS	.0309626	.0041518	7.46	0.000	.0228248	.0391005
DOS_t	.0863199	.0031821	27.13	0.000	.0800827	.092557
ppdays	.008164	.000783	10.43	0.000	.0066293	.0096987
gt90	0256472	.0009232	-27.78	0.000	0274568	0238376
pmax	.0622514	.0072018	8.64	0.000	.0481352	.0763676
tave	.0573018	.0016696	34.32	0.000	.0540291	.0605744
tmin	0704156	.0017975	-39.17	0.000	0739389	0668923
totalpp	.0012168	.0008474	1.44	0.151	0004441	.0028778
cdd	.001076	.0000494	21.79	0.000	.0009792	.0011728
_cons	-12.51567	.3840684	-32.59	0.000	-13.26848	-11.76286
sigma_u	.26018024					
sigma_e	.38461141					

.31394979 (fraction of variance due to u_i)

```
15 . predict Phat
```

(option xb assumed; fitted values)

16 . gen Phat1 = Phat * cluster1

17 . gen Phat2 = Phat * cluster2

18 . gen Phat3 = Phat * cluster3

19 . gen Phat4 = Phat * cluster4

20 . gen Phat5 = Phat * cluster5

 $corr(u_i, Xb) = 0.0001$

 $corr(u_i, Xb) = -0.1493$

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

Fixed-effects (within) regression Number of obs 202,507 Number of groups = Group variable: user_ 18,444 R-squared: Obs per group: Within = **0.1735** min = 1 Between = **0.0013** avg = 11.0 Overall = **0.0518** max = 11 F(9,18443) 2250.57

> Prob > F (Std. err. adjusted for 18,444 clusters in user_)

0.0000

0.0000

0	Coefficient	Robust std. err.	t	P> t	[95% conf.	intonvall
Q	Coefficient	sta. err.	ι	ווןלץ	[95% CONT.	incervaij
Phat	.1476109	.0334714	4.41	0.000	.0820039	.213218
DOS_t	.0136038	.0030145	4.51	0.000	.0076952	.0195124
ppdays	0134126	.0003399	-39.46	0.000	0140789	0127463
gt90	.0141415	.0008325	16.99	0.000	.0125097	.0157733
pmax	.0444112	.00419	10.60	0.000	.0361984	.052624
tave	0253609	.0021683	-11.70	0.000	0296111	0211108
tmin	.0500788	.0026194	19.12	0.000	.0449446	.055213
totalpp	0055823	.0006548	-8.53	0.000	0068658	0042988
cdd	0006707	.0000387	-17.35	0.000	0007465	000595
_cons	6.050036	.2764967	21.88	0.000	5.508077	6.591995
sigma_u	.62900035					
sigma_e	.38200192					
rho	.73054952	(fraction	of varia	nce due t	co u_i)	

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

Prob > chi2

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 = **0.5567** 11.0 avg = Overall = **0.0005** max = 11 Wald chi2(9) 5.43e+07 =

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

		Robust				
Q	Coefficient	std. err.	z	P> z	[95% conf.	interval]
P_ave	.1476111	.037085	3.98	0.000	.0749258	.2202964
DOS_t	.0136038	.0034585	3.93	0.000	.0068252	.0203823
ppdays	0134126	.0003954	-33.92	0.000	0141876	0126377
gt90	.0141415	.0008941	15.82	0.000	.0123891	.0158939
pmax	.0444112	.0048057	9.24	0.000	.0349922	.0538301
tave	0253609	.0023438	-10.82	0.000	0299548	0207671
tmin	.0500788	.0028447	17.60	0.000	.0445034	.0556542
totalpp	0055823	.0007585	-7.36	0.000	007069	0040956
cdd	0006707	.0000422	-15.91	0.000	0007534	0005881
_cons	6.050038	.3112914	19.44	0.000	5.439918	6.660158
sigma u	.6581392					
sigma e	.42625591					
rho	.70448618	(fraction	of varia	nce due t	o u_i)	

Instrumented: P_ave

Instruments: DOS_t ppdays gt90 pmax tave tmin totalpp cdd FC DOS

23 . xtivreg Q DOS_t ppdays gt90 rmax tave tmin totalpp cdd rhave pp ET (P_ave = FC DOS blockdiff1 blockdiff2), fe vce(robi variable rmax not found r(111);

24 . xtivreg Q DOS_t ppdays gt90 pmax tave tmin totalpp cdd rhave pp ET (P_ave = FC DOS blockdiff1 blockdiff2), fe vce(robi 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(10) = 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
рр	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 varia	nce due t	oui)	

Instrumented: P_ave

25 . xtreg P_ave DOS_t ppdays gt90 pmax tave tmin totalpp cdd rhave pp FC DOS blockdiff1, fe vce(robust)

note: FC omitted because of collinearity.
note: DOS omitted because of collinearity.

note: blockdiff1 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** 11.0 avg = 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_)

		Robust				
P_ave	Coefficient	std. err.	t	P> t	[95% conf.	interval]
DOS_t	.004313	.0035803	1.20	0.228	0027047	.0113307
ppdays	0364181	.0015488	-23.51	0.000	0394539	0333823
gt90	0104063	.001265	-8.23	0.000	0128857	0079268
pmax	0328426	.006925	-4.74	0.000	0464162	0192689
tave	.0804848	.0019955	40.33	0.000	.0765734	.0843961
tmin	1075526	.001968	-54.65	0.000	11141	1036951
totalpp	0584121	.0031211	-18.71	0.000	0645298	0522943
cdd	.0007931	.0000348	22.78	0.000	.0007248	.0008613
rhave	.029029	.001262	23.00	0.000	.0265554	.0315026
pp	6.891246	.3298136	20.89	0.000	6.244781	7.537711
FC	0	(omitted)				
DOS	0	(omitted)				
blockdiff1	0	(omitted)				
_cons	-4.756832	.1965932	-24.20	0.000	-5.142173	-4.371491
sigma u	.26018024					
sigma e	.38461141					
rho	.31394979	(fraction	of varia	nce due t	o u_i)	

- 26 . predict Phat_0
 (option xb assumed; fitted values)
- 27 . xtreg Q Phat_0 DOS_t ppdays gt90 pmax tave tmin totalpp cdd rhave pp, fe vce(robust)
 note: pp omitted because of collinearity.

Fixed-effects (within) regression Number of obs 202,507 Number of groups = Group variable: user_ 18,444 R-squared: Obs per group: Within = **0.1744** min = 1 Between = 0.0013avg = 11.0 Overall = **0.0521** max = 11 F(10,18443) 2053.50 $corr(u_i, Xb) = 0.0001$ 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 0	3798935	.0488621	-7.77	0.000	4756677	2841194
DOS t	.0257314	.0030549	8.42	0.000	.0197436	.0317192
ppdays	0206194	.0006278	-32.85	0.000	0218499	0193889
gt90	.0257972	.0012672	20.36	0.000	.0233134	.028281
pmax	.0770542	.0045926	16.78	0.000	.0680522	.0860562
tave	.0151777	.0033778	4.49	0.000	.0085569	.0217985
tmin	0016152	.0043529	-0.37	0.711	0101472	.0069168
totalpp	.0037699	.0008896	4.24	0.000	.0020262	.0055136
cdd	0006718	.0000387	-17.38	0.000	0007476	0005961
rhave	.027896	.0019411	14.37	0.000	.0240912	.0317008
рр	0	(omitted)				
_cons	1.926284	`.3775337	5.10	0.000	1.186283	2.666285
sigma_u	.62899585					
sigma e	.38180835					
rho	.7307462	(fraction	of varia	nce due t	o u_i)	

- 28 . gen Phat_01 = Phat_0 * cluster1
- 29 . xtivreg Q DOS_t ppdays gt90 rmax tave tmin totalpp cdd rhave pp ET (P_ave = FC DOS blockdiff1 blockdiff2), fe vce(robi variable rmax not found r(111);
- 30 . xtivreg Q DOS_t ppdays gt90 pmax tave tmin totalpp cdd rhave pp ET (P_ave = FC DOS blockdiff1 blockdiff2), fe vce(robinote: ET omitted because of collinearity.

note: blockdiff2 omitted because of collinearity.

First-stage within regression

Fixed-effects (within) regression Group variable: user_	Number of obs = Number of groups =	,
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

P_ave	Coefficient	Robust std. err.	t	P> t	[95% conf.	interval]
DOS_t	.004313	.0035803	1.20	0.228	0027047	.0113307
ppdays	0364181	.0015488	-23.51	0.000	0394539	0333823
gt90	0104063	.001265	-8.23	0.000	0128857	0079268
pmax	0328426	.006925	-4.74	0.000	0464162	0192689
tave	.0804848	.0019955	40.33	0.000	.0765734	.0843961
tmin	1075526	.001968	-54.65	0.000	11141	1036951
totalpp	0584121	.0031211	-18.71	0.000	0645298	0522943
cdd	.0007931	.0000348	22.78	0.000	.0007248	.0008613
rhave	.029029	.001262	23.00	0.000	.0265554	.0315026
рр	6.891246	.3298136	20.89	0.000	6.244781	7.537711
ET	0	(omitted)				
FC	0	(omitted)				
DOS	0	(omitted)				
blockdiff1	0	(omitted)				
blockdiff2	0	(omitted)				
_cons	-4.756832	.1965932	-24.20	0.000	-5.142173	-4.371491

sigma_u sigma_e rho	.26018024 .38461141 .31394979	(fraction of	variance due to u_i)		
Fixed-effects Group variable	` '	regression	Number of obs Number of groups		202,507 18,444
R-squared: Within = Between = Overall =	= 0.5551		Obs per group: min avg max	=	1 11.0 11

Wald chi2(10) = 1.90e+15 corr(u_i, Xb) = 0.2527 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	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
рр	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 varia	nce due t	o u_i)	

Instrumented: P_ave

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

31 . xtivreg Q DOS_t ppdays gt90 pmax tave tmin totalpp cdd rhave pp ET (P_ave = FC DOS), fe vce(robust) first note: ET omitted because of collinearity.

First-stage within regression

Fixed-effects (within) regression Group variable: user_	Number of obs Number of groups		202,507 18,444
R-squared: Within = 0.1932 Between = 0.0032 Overall = 0.1446	Obs per group: min avg max	g =	1 11.0 11
corr(u_i, Xb) = 0.0003	F(10,18443) Prob > F	= =	2553.33 0.0000

in user_)	3,444 clusters	ed for 18	·. adjuste	(Std. err		,
		- 1.1		Robust		
interval]	[95% conf.	P> t	t	std. err.	Coefficient	P_ave
.0113307	0027047	0.228	1.20	.0035803	.004313	DOS t
0333823	0394539	0.000	-23.51	.0015488	0364181	ppdays
0079268	0128857	0.000	-8.23	.001265	0104063	gt90
0192689	0464162	0.000	-4.74	.006925	0328426	pmax
.0843961	.0765734	0.000	40.33	.0019955	.0804848	tave
1036951	11141	0.000	-54.65	.001968	1075526	tmin
0522943	0645298	0.000	-18.71	.0031211	0584121	totalpp
.0008613	.0007248	0.000	22.78	.0000348	.0007931	cdd
.0315026	.0265554	0.000	23.00	.001262	.029029	rhave
7.537711	6.244781	0.000	20.89	.3298136	6.891246	рр
				(omitted)	0	ET
				(omitted)	0	FC
				(omitted)	0	DOS
-4.371491	-5.142173	0.000	-24.20	.1965932	-4.756832	_cons
					.26018024	sigma u
					.38461141	sigma_e
	oui)	nce due t	of variar	(fraction	.31394979	rho
202,507 18,444	of obs = of groups =			regression	•	Fixed-effects Group variable R-squared:
1	min =				0.5278	Within =
11.0	avg =					Between =
11	max =				= 0.3833	Overall =
1.81e+08	ni2(10) =	Wald ch				
0.0000	, ,	Prob >			= 0.2527	<pre>corr(u_i, Xb)</pre>
in user_)	3,444 clusters	ed for 18	. adjuste	(Std. err		
				Robust		
interval]	[95% conf.	P> z	Z	std. err.	Coefficient	Q
3061992 .029871 0197214 .0278233 .0833501 .0203182	4535884 .0215918 0215174 .0237711 .0707585 .0100372	0.000 0.000 0.000 0.000 0.000 0.000	-10.10 12.18 -45.00 24.95 23.99 5.79	.0376 .0021121 .0004582 .0010338 .0032122 .0026228	3798938 .0257314 0206194 .0257972 .0770543 .0151777	P_ave DOS_t ppdays gt90 pmax tave

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
рр	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 varia	nce due t	o u_i)	

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

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

First-stage	within	regression
-------------	--------	------------

Fixed-effects (within) regression Group variable: user	Number of obs Number of groups		202,507 18,444
Group variable. user_	Number of groups	_	10,444
R-squared:	Obs per group:		
Within = 0.1932	mi	.n =	1
Between = 0.0032	av	'g =	11.0
Overall = 0.1446	ma	x =	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_)

		Robust				
P_ave	Coefficient	std. err.	t	P> t	[95% conf.	interval]
DOS_t	.0814415	.0026972	30.20	0.000	.0761548	.0867281
ppdays	.009736	.0009666	10.07	0.000	.0078414	.0116307
gt90	048661	.0028916	-16.83	0.000	0543288	0429933
pmax	.1272134	.0036741	34.62	0.000	.1200118	.134415
tave	.0579365	.0016434	35.25	0.000	.0547154	.0611577
tmin	0749527	.0014369	-52.16	0.000	0777692	0721361
totalpp	0059023	.0010988	-5.37	0.000	008056	0037485
cdd	.0019519	.0000816	23.91	0.000	.0017919	.0021119
rhave	0199621	.0026767	-7.46	0.000	0252087	0147155
FC	.2060491	.0098615	20.89	0.000	.1867197	.2253785
DOS	0	(omitted)				
_cons	-10.57841	.1541481	-68.62	0.000	-10.88056	-10.27627
sigma_u	.26018024					
sigma e	.38461141					
rho	.31394979	(fraction	of varia	nce due t	o u_i)	

Fixed-effects (within) IV regression Group variable: user_	Number of obs = Number of groups =	202,507 18,444
R-squared:	Obs per group:	4
Within = 0.5278	min =	1
Between = 0.5551	avg =	11.0
Overall = 0.3833	max =	11

Q	Coefficient	Robust 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
_cons	1.926281	.2798986	6.88	0.000	1.37769	2.474872

 sigma_u
 .55917503

 sigma_e
 .28873212

rho .78950203 (fraction of variance due to u_i)

Instrumented: P_ave

Instruments: DOS_t ppdays gt90 pmax tave tmin totalpp cdd rhave FC DOS

33 . xtivreg Q DOS_t ppdays gt90 pmax tave tmin totalpp cdd rhave pp ET (P_ave = FC blockdiff2), fe vce(robust) first note: ET omitted because of collinearity.

First-stage within regression

Fixed-effects (within) IV regression

Fixed-effects (within) regression Number of obs 202,507 Number of groups = 18,444 Group variable: user_ R-squared: Obs per group: Within = **0.1932** min = 1 Between = **0.0032** 11.0 avg = Overall = **0.1446** max = 11 F(10,18443) 2553.33 corr(u i, Xb) = 0.0003Prob > F 0.0000

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

Number of obs

202,507

		Robust				
P_ave	Coefficient	std. err.	t	P> t	[95% conf.	interval]
DOS_t	.004313	.0035803	1.20	0.228	0027047	.0113307
ppdays	0364181	.0015488	-23.51	0.000	0394539	0333823
gt90	0104063	.001265	-8.23	0.000	0128857	0079268
pmax	0328426	.006925	-4.74	0.000	0464162	0192689
tave	.0804848	.0019955	40.33	0.000	.0765734	.0843961
tmin	1075526	.001968	-54.65	0.000	11141	1036951
totalpp	0584121	.0031211	-18.71	0.000	0645298	0522943
cdd	.0007931	.0000348	22.78	0.000	.0007248	.0008613
rhave	.029029	.001262	23.00	0.000	.0265554	.0315026
рр	6.891246	.3298136	20.89	0.000	6.244781	7.537711
ET	0	(omitted)				
FC	0	(omitted)				
blockdiff2	0	(omitted)				
_cons	-4.756832	.1965932	-24.20	0.000	-5.142173	-4.371491
sigma u	.26018024					
sigma e	.38461141					
rho	.31394979	(fraction	of varia	nce due t	oui)	
					· · · · · · · · · · · · · · · · · · ·	

 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

(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	306199
DOS_t	.0257314	.0021121	12.18	0.000	.0215918	.02987
ppdays	0206194	.0004582	-45.00	0.000	0215174	019721
gt90	.0257972	.0010338	24.95	0.000	.0237711	.027823
pmax	.0770543	.0032122	23.99	0.000	.0707585	.083350
tave	.0151777	.0026228	5.79	0.000	.0100372	.020318
tmin	0016152	.0033984	-0.48	0.635	0082759	.005045
totalpp	.0037699	.0006277	6.01	0.000	.0025396	.005000
cdd	0006718	.0000312	-21.55	0.000	000733	000610
rhave	.027896	.0014806	18.84	0.000	.0249941	.030797
рр	0	(omitted)				
ET	0	(omitted)				
_cons	1.926281	.2798986	6.88	0.000	1.37769	2.47487
sigma u	.55917503					
sigma e	.28873291					
rho	.78950113	(fraction	of varia	nce due t	o u i)	

Instrumented: P_ave

Instruments: DOS_t ppdays gt90 pmax tave tmin totalpp cdd rhave pp FC

blockdiff2

34 . xtivreg Q DOS_t ppdays gt90 pmax tave tmin totalpp cdd rhave (P_ave = FC DOS blockdiff2), fe vce(robust) first

First-stage within regression

Fixed-effects (within) regression Group variable: user _	Number of obs Number of groups		202,507 18,444
R-squared: Within = 0.1932 Between = 0.0032 Overall = 0.1446	Obs per group: min avg max	=	1 11.0 11
corr(u_i, Xb) = 0.0003	F(10,18443) Prob > F	=	2553.33 0.0000

P_ave	Coefficient	Robust std. err.	t	P> t	[95% conf.	interval]
DOS_t	.0814415	.0026972	30.20	0.000	.0761548	.0867281
ppdays	.009736	.0009666	10.07	0.000	.0078414	.0116307
gt90	048661	.0028916	-16.83	0.000	0543288	0429933
pmax	.1272134	.0036741	34.62	0.000	.1200118	.134415
tave	.0579365	.0016434	35.25	0.000	.0547154	.0611577
tmin	0749527	.0014369	-52.16	0.000	0777692	0721361
totalpp	0059023	.0010988	-5.37	0.000	008056	0037485
cdd	.0019519	.0000816	23.91	0.000	.0017919	.0021119
rhave	0199621	.0026767	-7.46	0.000	0252087	0147155
FC	.2060491	.0098615	20.89	0.000	.1867197	.2253785
DOS	0	(omitted)				
blockdiff2	0	(omitted)				
_cons	-10.57841	.1541481	-68.62	0.000	-10.88056	-10.27627
sigma_u	.26018024					
sigma e	.38461141					
rho	.31394979 (fraction of variance due to u_i)					

Fixed-effects (within) IV regression Group variable: user_	Number of obs = Number of groups =	202,507 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(10) = 1.81e+08 corr(u_i, Xb) = 0.2527 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	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
_cons	1.926281	.2798986	6.88	0.000	1.37769	2.474872
sigma u	.55917503					
sigma_e	.28873212					
rho	.78950203	(fraction	of varia	nce due t	o u_i)	

Instrumented: P_ave

Instruments: DOS_t ppdays gt90 pmax tave tmin totalpp cdd rhave FC DOS

blockdiff2

35 . xtreg $P_ave DOS_t ppdays gt90 pmax tave tmin totalpp cdd rhave DOS FC, fe vce(robust) note: FC omitted because of collinearity.$

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

		Robust				
P_ave	Coefficient	std. err.	t	P> t	[95% conf.	interval]
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
cdd	0000225	.0000326	-0.69	0.491	0000863	.0000414
rhave	.0250349	.0012787	19.58	0.000	.0225285	.0275414
DOS	.0697937	.0033403	20.89	0.000	.0632463	.076341
FC	0	(omitted)				

_cons	-14.94523	.3383839	-44.17	0.000	-15.60849	-14.28197
sigma_u sigma_e rho	.26018024 .38461141 .31394979	(fraction	of varia	nce due t	o u_i)	

36 . predict Phat1

variable Phat1 already defined r(110);

37 . predict Phat_02
 (option xb assumed; fitted values)

38 . xtreg Q Phat_02 DOS_t ppdays gt90 pmax tave tmin totalpp cdd rhave, fe vce(robust)

202,507 Fixed-effects (within) regression Number of obs Number of groups = Group variable: user_ 18,444 R-squared: Obs per group: Within = **0.1744** min = 1 Between = **0.0013** avg = 11.0 Overall = **0.0521** max = 11 F(10,18443) 2053.50 $corr(u_i, Xb) = 0.0001$ 0.0000 Prob > F

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

Q	Coefficient	Robust std. err.	t	P> t	[95% conf.	interval]
Phat 02	3798935	.0488621	-7.77	0.000	4756677	2841194
DOS t	.0257314	.0030549	8.42	0.000	.0197436	.0317192
ppdays	0206194	.0006278	-32.85	0.000	0218499	0193889
gt90	.0257972	.0012672	20.36	0.000	.0233134	.028281
pmax	.0770542	.0045926	16.78	0.000	.0680522	.0860562
tave	.0151777	.0033778	4.49	0.000	.0085569	.0217985
tmin	0016152	.0043529	-0.37	0.711	0101472	.0069168
totalpp	.0037699	.0008896	4.24	0.000	.0020262	.0055136
cdd	0006718	.0000387	-17.38	0.000	0007476	0005961
rhave	.027896	.0019411	14.37	0.000	.0240912	.0317008
_cons	1.926284	.3775337	5.10	0.000	1.186283	2.666285
sigma u	.62899585					
sigma e	.38180835					
rho	.7307462	(fraction	of varia	nce due t	o u_i)	

39 . xtreg Q Phat_02 Phat1 Phat2 Phat3 Phat4 DOS_t ppdays gt90 pmax tave tmin totalpp cdd rhave, fe vce(robust)

Number of obs Fixed-effects (within) regression 202,507 Group variable: user_ Number of groups = 18,444 R-squared: Obs per group: Within = **0.1747** min = 1 Between = **0.0362** avg = 11.0 Overall = **0.0075** 11 max = F(14,18443) = 1484.26 $corr(u_i, Xb) = -0.2226$ 0.0000 Prob > F

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

Q	Coefficient	Robust std. err.	t	P> t	[95% conf.	interval]
Phat 02	3864003	.0493226	-7.83	0.000	4830772	2897234
Phat1	.0421223	.0203908	2.07	0.039	.0021543	.0820902
Phat2	037384	.0159899	-2.34	0.019	0687257	0060424
Phat3	.0909883	.0177832	5.12	0.000	.0561316	.125845
Phat4	0034142	.013525	-0.25	0.801	0299244	.0230959
DOS t	.0257312	.0030549	8.42	0.000	.0197433	.0317192
ppdays	0206195	.0006278	-32.84	0.000	02185	0193889
gt90	.0257976	.0012672	20.36	0.000	.0233137	.0282814
pmax	.0770517	.0045927	16.78	0.000	.0680495	.0860539
tave	.0151811	.0033779	4.49	0.000	.0085602	.0218021
tmin	0016192	.004353	-0.37	0.710	0101515	.006913
totalpp	.0037708	.0008896	4.24	0.000	.0020272	.0055145
cdd	0006718	.0000387	-17.38	0.000	0007476	0005961
rhave	.0278977	.0019412	14.37	0.000	.0240928	.0317027
_cons	1.926072	.3775914	5.10	0.000	1.185958	2.666186
sigma_u	.66383131					 -
sigma_e	.38174372					
rho	.7514867	(fraction	of varia	nce due t	o u_i)	

40 . xtset user_ period_

Panel variable: user_ (unbalanced)

Time variable: period_, 2 to 12, but with gaps

Delta: 1 unit

41 . xtreg P_ave FC blockdiff1 blockdiff2 DOS DOS_t ppdays gt90 pmax tave tmin totalpp cdd rhave pp ET, fe vce(robust)

note: blockdiff1 omitted because of collinearity.
note: blockdiff2 omitted because of collinearity.
note: rhave omitted because of collinearity.
note: pp omitted because of collinearity.
note: ET omitted because of collinearity.

202,507 Fixed-effects (within) regression Number of obs = Group variable: user_ Number of groups = 18,444 R-squared: Obs per group: Within = **0.1932** min = 1 Between = **0.0032** 11.0 avg = Overall = **0.1446** max = 11 F(10,18443) 2553.33 $corr(u_i, Xb) = 0.0003$ Prob > F 0.0000

P_ave	Coefficient	Robust std. err.	t	P> t	[95% conf.	interval]
FC	.1146393	.0058556	19.58	0.000	.1031619	.1261168
blockdiff1	0	(omitted)				
blockdiff2	0	(omitted)				
DOS	.0309626	.0041518	7.46	0.000	.0228248	.0391005
DOS_t	.0863199	.0031821	27.13	0.000	.0800827	.092557
ppdays	.008164	.000783	10.43	0.000	.0066293	.0096987
gt90	0256472	.0009232	-27.78	0.000	0274568	0238376
pmax	.0622514	.0072018	8.64	0.000	.0481352	.0763676
tave	.0573018	.0016696	34.32	0.000	.0540291	.0605744
tmin	0704156	.0017975	-39.17	0.000	0739389	0668923
totalpp	.0012168	.0008474	1.44	0.151	0004441	.0028778
cdd	.001076	.0000494	21.79	0.000	.0009792	.0011728

rhave pp ET _cons	0 0 0 -12.51567	<pre>(omitted) (omitted) (omitted) .3840684</pre>	-32.59	0.000	-13.26848	-11.76286
sigma_u sigma_e rho	.26018024 .38461141 .31394979	(fraction	of varia	nce due t	o u_i)	

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

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

		Robust				
P_ave	Coefficient	std. err.	t	P> t	[95% conf.	interval]
FC	.1146393	.0058556	19.58	0.000	.1031619	.1261168
DOS	.0309626	.0041518	7.46	0.000	.0228248	.0391005
DOS_t	.0863199	.0031821	27.13	0.000	.0800827	.092557
ppdays	.008164	.000783	10.43	0.000	.0066293	.0096987
gt90	0256472	.0009232	-27.78	0.000	0274568	0238376
pmax	.0622514	.0072018	8.64	0.000	.0481352	.0763676
tave	.0573018	.0016696	34.32	0.000	.0540291	.0605744
tmin	0704156	.0017975	-39.17	0.000	0739389	0668923
totalpp	.0012168	.0008474	1.44	0.151	0004441	.0028778
cdd	.001076	.0000494	21.79	0.000	.0009792	.0011728
rhave	0	(omitted)				
_cons	-12.51567	.3840684	-32.59	0.000	-13.26848	-11.76286
sigma_u	.26018024					
sigma_e	.38461141					
rho	.31394979	(fraction	of varia	nce due t	o u_i)	
	l					

- 43 . predict Phat_03
 (option xb assumed; fitted values)
- 44 . xtreg Q Phat_03 DOS_t ppdays gt90 pmax tave tmin totalpp cdd, 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 = **0.1735** min = 1 Between = **0.0013** 11.0 avg = Overall = **0.0518** max = 11 F(9,18443) 2250.57 = $corr(u_i, Xb) = 0.0001$ Prob > F 0.0000

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

		Robust				
Q	Coefficient	std. err.	t	P> t	[95% conf.	interval]
Phat_03	.1476109	.0334714	4.41	0.000	.0820039	.213218
DOS_t	.0136038	.0030145	4.51	0.000	.0076952	.0195124
ppdays	0134126	.0003399	-39.46	0.000	0140789	0127463
gt90	.0141415	.0008325	16.99	0.000	.0125097	.0157733
pmax	.0444112	.00419	10.60	0.000	.0361984	.052624
tave	0253609	.0021683	-11.70	0.000	0296111	0211108
tmin	.0500788	.0026194	19.12	0.000	.0449446	.055213
totalpp	0055823	.0006548	-8.53	0.000	0068658	0042988
cdd	0006707	.0000387	-17.35	0.000	0007465	000595
_cons	6.050036	.2764967	21.88	0.000	5.508077	6.591995
sigma_u	.62900035					
sigma_e	.38200192					
rho	.73054952	(fraction	of varia	nce due t	o u_i)	

45 . xtreg Q Phat DOS_t ppdays gt90 pmax tave tmin totalpp cdd, fe

Fixed-effects (within) regression Group variable: user_	Number of obs = Number of groups =	- ,
R-squared: Within = 0.1735	Obs per group: min =	
Between = 0.0013 Overall = 0.0518	avg = max =	
corr(u_i, Xb) = 0.0001	(5,20,051)	= 4293.51 = 0.0000

Q	Coefficient	Std. err.	t	P> t	[95% conf.	interval]
Phat	.1476109	.0353286	4.18	0.000	.0783676	.2168542
DOS_t	.0136038	.0039328	3.46	0.001	.0058956	.021312
ppdays	0134126	.0004754	-28.21	0.000	0143444	0124808
gt90	.0141415	.0005714	24.75	0.000	.0130215	.0152615
pmax	.0444112	.0054317	8.18	0.000	.0337651	.0550573
tave	0253609	.0017211	-14.73	0.000	0287343	0219875
tmin	.0500788	.0022501	22.26	0.000	.0456686	.054489
totalpp	0055823	.0008671	-6.44	0.000	0072818	0038828
cdd	0006707	.0000346	-19.41	0.000	0007385	000603
_cons	6.050036	.3239147	18.68	0.000	5.415171	6.684901
sigma_u sigma_e rho	.62900035 .38200192 .73054952	(fraction	of varia	nce due t	o u_i)	

F test that all u_i=0: F(18443, 184054) = 28.40 Prob > F = 0.0000

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

Fixed-effects (within) IV regression Group variable: user_	Number of obs = Number of groups =	202,507 18,444
R-squared: Within = 0.5278	Obs per group: min =	1
Between = 0.5551 Overall = 0.3833	min = avg = max =	11.0 11

(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
_cons	1.926281	.2798986	6.88	0.000	1.37769	2.474872
sigma u	.55917503					
sigma e	.28873212					
rho	.78950203	(fraction	of varia	nce due t	o u_i)	

Instrumented: P_ave

Instruments: DOS_t ppdays gt90 pmax tave tmin totalpp cdd rhave DOS FC

47 . gen P_ave1 = P_ave * cluster1

48 . gen P_ave2 = P_ave * cluster2

49 . gen P_ave3 = P_ave * cluster3

50 . gen P_ave4 = P_ave * cluster4

51 . gen P_ave5 = P_ave * cluster5

52 . xtreg Q P_ave P_ave1 P_ave2 P_ave3 P_ave4 DOS_t ppdays gt90 pmax tave tmin totalpp cdd rhave, fe

Fixed-effects (within) regression	Number of obs	=	202,507
Group variable: user_	Number of group	s =	18,444
R-squared:	Obs per group:		
Within = 0.6422	m	in =	1
Between = 0.2235	a	vg =	11.0
Overall = 0.3240	r	ax =	11
	F(14,184049)	=	23592.09
corr(u_i, Xb) = 0.0392	Prob > F	=	0.0000

Q	Coefficient	Std. err.	t	P> t	[95% conf.	interval]
P_ave	7015611	.0028199	-248.79	0.000	707088	6960342
P ave1	021425	.0048578	-4.41	0.000	0309461	0119038
P_ave2	1085579	.0038694	-28.06	0.000	1161418	1009741
P_ave3	.0376282	.0046683	8.06	0.000	.0284785	.0467779
P_ave4	0700705	.0038455	-18.22	0.000	0776076	0625334
DOS_t	.0463091	.0017125	27.04	0.000	.0429526	.0496657
ppdays	0228416	.0004239	-53.88	0.000	0236724	0220107
gt90	.0291385	.0006039	48.25	0.000	.0279548	.0303221
pmax	.1094397	.0022907	47.78	0.000	.10495	.1139294
tave	.0366809	.0011293	32.48	0.000	.0344676	.0388942
tmin	0309797	.0009709	-31.91	0.000	0328827	0290767
totalpp	.0051564	.0007192	7.17	0.000	.0037468	.0065661
cdd	000554	.0000191	-29.06	0.000	0005914	0005166
rhave	.0388573	.0009072	42.83	0.000	.0370792	.0406354

_cons	-1.056216	.0726595	-14.54	0.000	-1.198627	9138049
sigma_u sigma_e rho	.55683073 .25136044 .83072113	(fraction	of varia	nce due t	o u_i)	

F test that all $u_i=0$: F(18443, 184049) = 37.54 Prob > F = 0.0000

53 . xtreg Q P_ave P_ave1 P_ave2 P_ave3 P_ave4 DOS_t ppdays gt90 pmax tave tmin totalpp cdd rhave, fe vce(robust)

Fixed-effects (within) regression Group variable: user_	Number of obs Number of groups		202,507 18,444
R-squared:	Obs per group:		
Within = 0.6422	min	=	1
Between = 0.2235	avg	=	11.0
Overall = 0.3240	max	=	11
	F(14,18443)	=	7449.00
corr(u_i, Xb) = 0.0392	Prob > F	=	0.0000

		Robust				
Q	Coefficient	std. err.	t	P> t	[95% conf.	interval]
P_ave	7015611	.0116023	-60.47	0.000	7243027	6788196
P_ave1	021425	.0217819	-0.98	0.325	0641196	.0212696
P_ave2	1085579	.0151728	-7.15	0.000	1382979	0788179
P_ave3	.0376282	.019842	1.90	0.058	0012641	.0765204
P ave4	0700705	.0159921	-4.38	0.000	1014164	0387245
DOS_t	.0463091	.0013362	34.66	0.000	.04369	.0489283
ppdays	0228416	.000352	-64.89	0.000	0235315	0221517
gt90	.0291385	.0008815	33.05	0.000	.0274106	.0308664
pmax	.1094397	.0018819	58.15	0.000	.105751	.1131284
tave	.0366809	.0009628	38.10	0.000	.0347938	.038568
tmin	0309797	.0009718	-31.88	0.000	0328844	029075
totalpp	.0051564	.0005007	10.30	0.000	.0041749	.0061379
cdd	000554	.0000216	-25.59	0.000	0005964	0005116
rhave	.0388573	.0009094	42.73	0.000	.0370748	.0406398
_cons	-1.056216	.0776897	-13.60	0.000	-1.208495	903937
sigma_u	.55683073					
sigma_e	.25136044					
rho	.83072113	(fraction	of varia	nce due t	co u_i)	