Between regression (regression on group means) Number of obs   =   4,360
       name: <unnamed>
        log: D:\第10章.smcl
   log type: smcl
  opened on: 5 Aug 2024, 10:06:28

. do "D:\书稿\因果推断\命令\第10章.do" , nostop

. **
. *   短面板模型   *
. **
.
. use "C:\Users\XuQi\Desktop\wagepan.dta", clear

.
. *设置数据为追踪数据
. xtset nr year

Panel variable: nr (strongly balanced)
 Time variable: year, 1980 to 1987
         Delta: 1 unit

.
. *描述数据缺失情况
. xtdescribe

      nr: 13, 17, ..., 12548   n =   545
    year: 1980, 1981, ..., 1987   T =   8
           Delta(year) = 1 unit
           Span(year) = 8 periods
           (nr*year uniquely identifies each observation)

Distribution of T_i: min   5%   25%   50%   75%   95%   max
                         8   8   8   8   8   8   8

      Freq.   Percent   Cum. | Pattern
    ---------------------------+----------
        545   100.00 100.00 | 11111111
    ---------------------------+----------
        545   100.00 | XXXXXXXX

.
. *描述变量的组内和组间方差
. xtsum lwage black hisp educ year married exper exper2 union

Variable		Mean	Std. dev.	Min	Max	Observations	
lwage	overall	1.649147	.5326094	-3.579079	4.05186	N =	4360
	between		.3907468	.3333435	3.174173	n =	545
	within		.3622636	-2.467201	3.204687	T =	8
black	overall	.1155963	.3197769	0	1	N =	4360
	between		.320034	0	1	n =	545
	within		0	.1155963	.1155963	T =	8
hisp	overall	.1559633	.3628622	0	1	N =	4360
	between		.3631539	0	1	n =	545
	within		0	.1559633	.1559633	T =	8
educ	overall	11.76697	1.746181	3	16	N =	4360
	between		1.747585	3	16	n =	545
	within		0	11.76697	11.76697	T =	8
year	overall	1983.5	2.291551	1980	1987	N =	4360
	between		0	1983.5	1983.5	n =	545
	within		2.291551	1980	1987	T =	8
married	overall	.4389908	.4963208	0	1	N =	4360
	between		.3766116	0	1	n =	545
	within		.3236137	-.4360092	1.313991	T =	8
exper	overall	6.514679	2.825873	0	18	N =	4360
	between		1.654918	3.5	14.5	n =	545
	within		2.291551	3.014679	10.01468	T =	8
exper2	overall	50.42477	40.78199	0	324	N =	4360
	between		26.35134	17.5	215.5	n =	545
	within		31.1431	-44.07523	158.9248	T =	8

```
union   overall   .2440367   .4295639          0          1   N =     4360
        between              .3294467          0          1   n =      545
        within               .2759787  -.6309633   1.119037   T =        8
```

.
. *描述个体时间序列
. xtline lwage if nr<100

.
. *混合线性回归
. xtreg lwage black hisp union married exper exper2 year educ, pa corr(independent) vce(robust)

Iteration 1: Tolerance = 1.346e-10

```
GEE population-averaged model          Number of obs   =    4,360
Group variable: nr                     Number of groups =      545
Family: Gaussian                       Obs per group:
Link:  Identity                                    min =        8
Correlation: independent                           avg =      8.0
                                                   max =        8
                                       Wald chi2(8)    =   621.34
Scale parameter = .2300891             Prob > chi2     =   0.0000

Pearson chi2(4360)   =   1003.19       Deviance        =   1003.19
Dispersion (Pearson) = .2300891        Dispersion      = .2300891
```

(Std. err. adjusted for clustering on nr)

lwage	Coefficient	Robust std. err.	z	P>|z|	[95% conf. interval]	
black	-.1392244	.050428	-2.76	0.006	-.2380614	-.0403874
hisp	.0158267	.03894	0.41	0.684	-.0604943	.0921478
union	.1830538	.027393	6.68	0.000	.1293645	.2367431
married	.1080949	.0259289	4.17	0.000	.0572751	.1589147
exper	.0645952	.0173346	3.73	0.000	.03062	.0985703
exper2	-.0022382	.0008428	-2.66	0.008	-.0038901	-.0005863
year	.0218522	.0118747	1.84	0.066	-.0014218	.0451263
educ	.0914692	.0110806	8.25	0.000	.0697516	.1131868
_cons	-43.15754	23.40199	-1.84	0.065	-89.0246	2.709523

. regress lwage black hisp union married exper exper2 year educ, vce(cluster nr)

```
Linear regression                      Number of obs   =    4,360
                                       F(8, 544)       =    77.52
                                       Prob > F        =   0.0000
                                       R-squared       =   0.1887
                                       Root MSE        =   .48017
```

(Std. err. adjusted for 545 clusters in nr)

lwage	Coefficient	Robust std. err.	t	P>|t|	[95% conf. interval]	
black	-.1392244	.0504743	-2.76	0.006	-.2383728	-.040076
hisp	.0158267	.0389758	0.41	0.685	-.0607348	.0923882
union	.1830538	.0274182	6.68	0.000	.1291954	.2369122
married	.1080949	.0259528	4.17	0.000	.057115	.1590748
exper	.0645952	.0173505	3.72	0.000	.030513	.0986774
exper2	-.0022382	.0008436	-2.65	0.008	-.0038953	-.0005811
year	.0218522	.0118857	1.84	0.067	-.0014952	.0451996
educ	.0914692	.0110908	8.25	0.000	.0696832	.1132552
_cons	-43.15754	23.4235	-1.84	0.066	-89.16912	2.854039

```
.
. *固定效应模型
. *LSDV法
. qui regress lwage union married exper exper2 i.nr, vce(cluster nr)

. estimates table, keep(union married exper exper2) b se
```

Variable	Active
union	.08208713
	.02440148
married	.04530332
	.02245327
exper	.11684669
	.0114521
exper2	-.00430089
	.00073343

Legend: b/se

```
.
. *均值差分法
. xtreg lwage union married exper exper2, fe vce(robust)
```

Fixed-effects (within) regression   Number of obs   =   **4,360**
Group variable: **nr**   Number of groups =   **545**

R-squared: Obs per group:
     Within = **0.1780**   min =   **8**
     Between = **0.0005**   avg =   **8.0**
     Overall = **0.0638**   max =   **8**

                                    F(4, 544)   =   **107.94**
corr(u_i, Xb) = **-0.1139**   Prob > F   =   **0.0000**

                   (Std. err. adjusted for **545** clusters in **nr**)

lwage	Coefficient	Robust std. err.	t	P>|t|	[95% conf. interval]	
union	.0820871	.0228266	3.60	0.000	.037248	.1269262
married	.0453033	.0210041	2.16	0.031	.0040442	.0865625
exper	.1168467	.010713	10.91	0.000	.0958028	.1378906
exper2	-.0043009	.0006861	-6.27	0.000	-.0056486	-.0029532
_cons	1.06488	.0366294	29.07	0.000	.9929274	1.136832
sigma_u	.4000539					
sigma_e	.35125535					
rho	.5646785	(fraction of variance due to u_i)				

```
.
. *一阶差分法
. regress D.(lwage union married exper exper2), vce(cluster nr) noconstant
```

Linear regression   Number of obs   =   **3,815**
                                    F(4, 544)   =   **93.68**
                                    Prob > F   =   **0.0000**
                                    R-squared   =   **0.0268**
                                    Root MSE   =   **.44304**

                   (Std. err. adjusted for **545** clusters in **nr**)

D.lwage	Coefficient	Robust std. err.	t	P>|t|	[95% conf. interval]	
union						
D1.	.0427878	.0220062	1.94	0.052	-.0004397	.0860153
married						
D1.	.0381377	.0242391	1.57	0.116	-.0094761	.0857515
exper						
D1.	.11575	.0143991	8.04	0.000	.0874654	.1440347
exper2						
D1.	-.0038824	.0009428	-4.12	0.000	-.0057343	-.0020304

```
                            |
.
. *随机效应模型
. *广义最小二乘估计
. xtreg lwage black hisp union married exper exper2 year educ, re theta vce(robust)

Random-effects GLS regression                   Number of obs     =      4,360
Group variable: nr                              Number of groups  =        545

R-squared:                                      Obs per group:
     Within  = 0.1774                                         min =          8
     Between = 0.1881                                         avg =        8.0
     Overall = 0.1829                                         max =          8

                                                Wald chi2(8)      =     573.35
corr(u_i, X) = 0 (assumed)                      Prob > chi2       =     0.0000
theta        = .64264094

                               (Std. err. adjusted for 545 clusters in nr)
```

| | | Robust | | | |
lwage	Coefficient	std. err.	z	P>|z|	[95% conf. interval]
black	-.1393043	.0508314	-2.74	0.006	-.238932	-.0396766
hisp	.0209246	.0397401	0.53	0.599	-.0569646	.0988137
union	.1080178	.0208882	5.17	0.000	.0670777	.148958
married	.0629524	.0189525	3.32	0.001	.0258062	.1000987
exper	.0942591	.0150814	6.25	0.000	.0647	.1238181
exper2	-.0039663	.0006701	-5.92	0.000	-.0052797	-.0026529
year	.0172317	.0118578	1.45	0.146	-.0060091	.0404725
educ	.0924148	.0111504	8.29	0.000	.0705604	.1142691
_cons	-34.07261	23.37069	-1.46	0.145	-79.87831	11.7331
sigma_u	.32456727					
sigma_e	.35125535					
rho	.46057172	(fraction of variance due to u_i)				

```
.
. *最大似然估计
. xtreg lwage black hisp union married exper exper2 year educ, mle vce(bootstrap)
(running xtreg on estimation sample)

Bootstrap replications (50): .........10.........20.........30.........40.........50 done

Random-effects ML regression                    Number of obs     =      4,360
                                                Replications      =         50
Group variable: nr                              Number of groups  =        545

Random effects u_i ~ Gaussian                   Obs per group:
                                                              min =          8
                                                              avg =        8.0
                                                              max =          8

                                                Wald chi2(8)      =     640.04
Log likelihood = -2192.1739                     Prob > chi2       =     0.0000

                               (Replications based on 545 clusters in nr)
```

| | Observed | Bootstrap | | | Normal-based |
lwage	coefficient	std. err.	z	P>|z|	[95% conf. interval]
black	-.1393088	.0453158	-3.07	0.002	-.2281262	-.0504914
hisp	.020958	.0452184	0.46	0.643	-.0676684	.1095845
union	.1074526	.0215128	4.99	0.000	.0652883	.1496169
married	.0625782	.0190134	3.29	0.001	.0253126	.0998438
exper	.0944108	.0153276	6.16	0.000	.0643693	.1244524
exper2	-.0039745	.0006183	-6.43	0.000	-.0051864	-.0027626
year	.0172076	.012268	1.40	0.161	-.0068373	.0412526
educ	.0924264	.0108917	8.49	0.000	.0710789	.1137738
_cons	-34.02529	24.16764	-1.41	0.159	-81.393	13.34243
/sigma_u	.3293644	.0116605			.3072852	.3530301
/sigma_e	.3512025	.0118234			.3287769	.3751576
rho	.467945	.0256036			.4181485	.5182488

```
LR test of sigma_u=0: chibar2(01) = 1582.70          Prob >= chibar2 = 0.000
```

.
. *组间估计量
. xtreg lwage black hisp union married exper exper2 year educ, be vce(bootstrap)
(running **xtreg** on estimation sample)

Bootstrap replications (**50**): ....10.........20.........30.........40.........50 done

Between regression (regression on group means)   Number of obs   =   4,360
Group variable: **nr**   Number of groups =   545

R-squared: Obs per group:
    Within = 0.0488   min =   8
    Between = 0.2192   avg =   8.0
    Overall = 0.1380   max =   8

                                                  Wald chi(**7**)   =   323.29
sd(u_i + avg(e_i.)) = .3475147   Prob > chi2   =   0.0000

                            (Replications based on **545** clusters in **nr**)

lwage	Observed coefficient	Bootstrap std. err.	z	P>|z|	Normal-based [95% conf. interval]	
black	-.1388124	.0533949	-2.60	0.009	-.2434645	-.0341603
hisp	.0047758	.0383924	0.12	0.901	-.0704718	.0800234
union	.2706765	.0442327	6.12	0.000	.183982	.3573711
married	.1436637	.0371383	3.87	0.000	.0708739	.2164535
exper	-.0504371	.0455379	-1.11	0.268	-.1396898	.0388155
exper2	.0051245	.0027754	1.85	0.065	-.0003152	.0105642
year	0	(omitted)				
educ	.0946036	.0111675	8.47	0.000	.0727158	.1164914
_cons	.492309	.2263725	2.17	0.030	.0486271	.9359909

.
. *Hausman检验
. qui xtreg lwage union married exper exper2, fe

. est store fe

.
. qui xtreg lwage black hisp union married exper exper2 year educ, re

. est store re

.
. hausman fe re, sigmamore

| | ─── Coefficients ─── | | | |
| | (b) | (B) | (b-B) | sqrt(diag(V_b-V_B)) |
	fe	re	Difference	Std. err.
union	.0820871	.1080178	-.0259307	.0074844
married	.0453033	.0629524	-.0176491	.007462
exper	.1168467	.0942591	.0225876	.
exper2	-.0043009	-.0039663	-.0003346	.0001159

                    b = Consistent under H0 and Ha; obtained from **xtreg**.
            B = Inconsistent under Ha, efficient under H0; obtained from **xtreg**.

Test of H0: Difference in coefficients not systematic

    chi2(**4**) = (b-B)'[(V_b-V_B)^(-1)](b-B)
            = **15.87**
Prob > chi2 = **0.0032**
(V_b-V_B is not positive definite)

. *稳健的Hausman检验
. qui xtreg lwage black hisp union married exper exper2 year educ, re vce(robust)

. xtoverid

Test of overidentifying restrictions: fixed vs random effects
Cross-section time-series model: xtreg re robust cluster(nr)
Sargan-Hansen statistic **28.711** Chi-sq(**4**)   P-value = **0.0000**

.
.
. **
. *   长面板模型   *
. **
.
. use "C:\Users\XuQi\Desktop\mus08cigar.dta", clear

.
. *设置为面板数据
. xtset state year

Panel variable: **state** (strongly balanced)
 Time variable: **year, 63 to 92**
         Delta: **1 unit**

.
. *LSDV法拟合个体效应模型，将时间T作为连续变量纳入模型
. reg lnc lnp lny lnpmin i.state year, vce(cluster state)

Linear regression   Number of obs   =   **300**
                                                F(3, 9)   =   .
                                                Prob > F   =   .
                                                R-squared   =   **0.7203**
                                                Root MSE   =   **.11203**

                      (Std. err. adjusted for **10** clusters in **state**)

lnc	Coefficient	Robust std. err.	t	P>|t|	[95% conf. interval]	
lnp	-1.027181	.4412156	-2.33	0.045	-2.02528	-.0290819
lny	.4975365	.4139086	1.20	0.260	-.4387899	1.433863
lnpmin	.5100582	.2627025	1.94	0.084	-.0842161	1.104332
state						
2	-.0773908	.0594636	-1.30	0.225	-.2119069	.0571252
3	.088557	.0090317	9.81	0.000	.0681259	.1089881
4	-.1809375	.1695839	-1.07	0.314	-.5645629	.202688
5	-.1066138	.2409767	-0.44	0.669	-.651741	.4385135
6	.2177434	.1063333	2.05	0.071	-.0227993	.458286
7	.115543	.1959351	0.59	0.570	-.327693	.5587791
8	.1068277	.124702	0.86	0.414	-.1752679	.3889233
9	.0433207	.04618	0.94	0.373	-.0611458	.1477872
10	-.133583	.0333562	-4.00	0.003	-.2090399	-.0581261
year	-.0429824	.0305275	-1.41	0.193	-.1120405	.0260757
_cons	6.153657	2.152852	2.86	0.019	1.283567	11.02375

.
. *检验组间异方差
. qui xtreg lnc lnp lny lnpmin year, fe vce(robust)

. xttest3

Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all i

chi2 (10) =   **378.90**
Prob>chi2 =   **0.0000**

.
. *检验组内自相关
. xi:xtserial lnc lnp lny lnpmin year i.state
i.state   _Istate_1-10   (naturally coded; _Istate_1 omitted)

Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
   F(1,   9) =   89.304
        Prob > F =   0.0000

.
. *检验组间同期相关
. qui xtreg lnc lnp lny lnpmin year, fe vce(robust)

. xttest2

Correlation matrix of residuals:

	__e1	__e2	__e3	__e4	__e5	__e6	__e7	__e8	__e9	__e1
__e1	.2921489									
__e2	-.0213432	.1777056								
__e3	.3780161	-.0190987	.5315973							
__e4	-.1132695	.0807039	-.1682104	.2440957						
__e5	-.094377	.0466794	-.1377809	.0877548	.1035723					
__e6	.0053953	.0979055	-.0120405	.1042869	.0761779	.1662647				
__e7	-.5039313	.2195519	-.686677	.3532443	.3409154	.2502154	1.573015			
__e8	.105558	.0783913	.1330914	.0172018	-.0239187	.0690433	-.1414606	.1194612		
__e9	.2069446	.0553588	.2848406	-.0674447	-.0578446	.0289819	-.334058	.1131528	.2109084	
__e10	.1678554	.0577682	.2299779	.0000346	-.0209553	.0422944	-.2226333	.0902976	.1584811	.171003

	__e1	__e2	__e3	__e4	__e5	__e6	__e7	__e8	__e9	__e10
__e1	1.0000									
__e2	-0.0937	1.0000								
__e3	0.9592	-0.0621	1.0000							
__e4	-0.4242	0.3875	-0.4670	1.0000						
__e5	-0.5426	0.3441	-0.5872	0.5519	1.0000					
__e6	0.0245	0.5696	-0.0405	0.5177	0.5805	1.0000				
__e7	-0.7434	0.4153	-0.7509	0.5701	0.8446	0.4893	1.0000			
__e8	0.5650	0.5380	0.5281	0.1007	-0.2150	0.4899	-0.3263	1.0000		
__e9	0.8337	0.2859	0.8507	-0.2972	-0.3914	0.1548	-0.5800	0.7129	1.0000	
__e10	0.7510	0.3314	0.7628	0.0002	-0.1575	0.2508	-0.4293	0.6318	0.8345	1.0000

Breusch-Pagan LM test of independence: chi2(45) =   376.963, Pr = 0.0000
Based on 30 complete observations over panel units

.
. *面板校正标准误
. xtpcse lnc lnp lny lnpmin year i.state

Linear regression, correlated panels corrected standard errors (PCSEs)

Group variable: **state**   Number of obs   =   300
Time variable: **year**   Number of groups =   10
Panels: **correlated (balanced)**   Obs per group:
Autocorrelation: **no autocorrelation**   min =   30
                                                        avg =   30
                                                        max =   30

Estimated covariances   =   55   R-squared   =   0.7203
Estimated autocorrelations =   0   Wald chi2(**13**)   =   2147.36
Estimated coefficients   =   14   Prob > chi2   =   0.0000

lnc	Coefficient	Panel-corrected std. err.	z	P>|z|	[95% conf. interval]	
lnp	-1.027181	.1332425	-7.71	0.000	-1.288332	-.7660305
lny	.4975365	.1804528	2.76	0.006	.1438554	.8512176
lnpmin	.5100582	.1393134	3.66	0.000	.237009	.7831074
year	-.0429824	.014234	-3.02	0.003	-.0708806	-.0150843
state						
2	-.0773908	.0389125	-1.99	0.047	-.153658	-.0011237
3	.088557	.011143	7.95	0.000	.0667171	.1103968
4	-.1809375	.0829463	-2.18	0.029	-.3435093	-.0183657
5	-.1066138	.1018461	-1.05	0.295	-.3062284	.0930008
6	.2177434	.049543	4.40	0.000	.1206408	.3148459
7	.115543	.0980092	1.18	0.238	-.0765516	.3076376

8	.1068277	.0483694	2.21	0.027	.0120255	.20163
9	.0433207	.0202198	2.14	0.032	.0036907	.0829508
10	-.133583	.0221487	-6.03	0.000	-.1769937	-.0901722
_cons	6.153657	.7886145	7.80	0.000	4.608002	7.699313

```
.
. *面板校正标准误+FGLS
. xtpcse lnc lnp lny lnpmin year i.state, corr(ar1)
note: estimates of rho outside [-1,1] bounded to be in the range [-1,1].

Prais-Winsten regression, correlated panels corrected standard errors (PCSEs)
```

Group variable:	**state**	Number of obs =	**300**
Time variable:	**year**	Number of groups =	**10**
Panels:	**correlated (balanced)**	Obs per group:	
Autocorrelation:	**common AR(1)**	min =	**30**
		avg =	**30**
		max =	**30**
Estimated covariances =	**55**	R-squared =	**0.9824**
Estimated autocorrelations =	**1**	Wald chi2(**13**) =	**504.30**
Estimated coefficients =	**14**	Prob > chi2 =	**0.0000**

lnc	Coefficient	Panel-corrected std. err.	z	P>|z|	[95% conf. interval]	
lnp	-.3440621	.0571589	-6.02	0.000	-.4560914	-.2320328
lny	.5661073	.1566725	3.61	0.000	.2590348	.8731798
lnpmin	.1000875	.0736082	1.36	0.174	-.044182	.2443569
year	-.0498643	.0121104	-4.12	0.000	-.0736003	-.0261283
state						
2	-.0784486	.0519567	-1.51	0.131	-.1802818	.0233846
3	.0954506	.0261747	3.65	0.000	.0441491	.146752
4	-.207494	.0810219	-2.56	0.010	-.366294	-.048694
5	-.1811666	.0977461	-1.85	0.064	-.3727454	.0104123
6	.185644	.0554283	3.35	0.001	.0770065	.2942816
7	.0701358	.120881	0.58	0.562	-.1667866	.3070582
8	.0397148	.0507738	0.78	0.434	-.0598001	.1392297
9	.0231754	.025083	0.92	0.356	-.0259863	.0723371
10	-.1289763	.0387423	-3.33	0.001	-.2049099	-.0530428
_cons	4.837936	.6044356	8.00	0.000	3.653264	6.022608
rho	.7936188					

```
. xtpcse lnc lnp lny lnpmin year i.state, corr(psar1)
note: estimates of rho outside [-1,1] bounded to be in the range [-1,1].

Prais-Winsten regression, correlated panels corrected standard errors (PCSEs)
```

Group variable:	**state**	Number of obs =	**300**
Time variable:	**year**	Number of groups =	**10**
Panels:	**correlated (balanced)**	Obs per group:	
Autocorrelation:	**panel-specific AR(1)**	min =	**30**
		avg =	**30**
		max =	**30**
Estimated covariances =	**55**	R-squared =	**0.9954**
Estimated autocorrelations =	**10**	Wald chi2(**12**) =	**855.24**
Estimated coefficients =	**13**	Prob > chi2 =	**0.0000**

lnc	Coefficient	Panel-corrected std. err.	z	P>|z|	[95% conf. interval]	
lnp	-.2960784	.0539584	-5.49	0.000	-.401835	-.1903218
lny	.5326598	.1350574	3.94	0.000	.2679522	.7973674
lnpmin	.0507118	.0673426	0.75	0.451	-.0812772	.1827009
year	-.0488194	.0103959	-4.70	0.000	-.0691949	-.0284439
state						
2	-.0639957	.0802776	-0.80	0.425	-.2213369	.0933456
3	0	(omitted)				
4	-.187228	.0981734	-1.91	0.057	-.3796444	.0051885
5	-.163645	.1128024	-1.45	0.147	-.3847336	.0574436

6	.1980726	.0809248	2.45	0.014	.0394629	.3566822
7	.0796166	.1709107	0.47	0.641	-.2553622	.4145954
8	.0492827	.0817016	0.60	0.546	-.1108495	.2094149
9	.0263335	.0630703	0.42	0.676	-.097282	.149949
10	-.1229701	.065134	-1.89	0.059	-.2506303	.0046901
_cons	5.0428	.5477758	9.21	0.000	3.969179	6.116421

| rhos = | .9414582 | .66151 | 1 | .7045066 | .7351521 ... | .6905643 |

.
. *全面FGLS
. xtgls lnc lnp lny lnpmin year i.state, panels(cor) corr(ar1)

Cross-sectional time-series FGLS regression

Coefficients: **generalized least squares**
Panels: **heteroskedastic with cross-sectional correlation**
Correlation: **common AR(1) coefficient for all panels (0.7967)**

Estimated covariances   =   55   Number of obs   =   300
Estimated autocorrelations =   1   Number of groups   =   10
Estimated coefficients   =   14   Time periods   =   30
                                              Wald chi2(**13**)   =   797.11
                                              Prob > chi2   =   0.0000

lnc	Coefficient	Std. err.	z	P>|z|	[95% conf. interval]	
lnp	-.3629823	.0239353	-15.17	0.000	-.4098947	-.3160699
lny	.5116673	.0733079	6.98	0.000	.3679865	.655348
lnpmin	.0258594	.0302743	0.85	0.393	-.033477	.0851959
year	-.0448556	.0057821	-7.76	0.000	-.0561884	-.0335228
state						
2	-.0719573	.0471313	-1.53	0.127	-.164333	.0204185
3	.0913241	.0260485	3.51	0.000	.04027	.1423782
4	-.1844595	.056133	-3.29	0.001	-.2944782	-.0744407
5	-.1466676	.0636223	-2.31	0.021	-.271365	-.0219701
6	.198174	.0424493	4.67	0.000	.114975	.2813731
7	.0861722	.1025173	0.84	0.401	-.1147579	.2871024
8	.0548621	.0386937	1.42	0.156	-.0209761	.1307003
9	.0227095	.0204346	1.11	0.266	-.0173416	.0627607
10	-.1279293	.0359818	-3.56	0.000	-.1984523	-.0574063
_cons	5.331351	.2815822	18.93	0.000	4.77946	5.883242

. xtgls lnc lnp lny lnpmin year i.state, panels(cor) corr(psar1)

Cross-sectional time-series FGLS regression

Coefficients: **generalized least squares**
Panels: **heteroskedastic with cross-sectional correlation**
Correlation: **panel-specific AR(1)**

Estimated covariances   =   55   Number of obs   =   300
Estimated autocorrelations =   10   Number of groups   =   10
Estimated coefficients   =   14   Time periods   =   30
                                              Wald chi2(**13**)   =   1246.78
                                              Prob > chi2   =   0.0000

lnc	Coefficient	Std. err.	z	P>|z|	[95% conf. interval]	
lnp	-.3541126	.024395	-14.52	0.000	-.4019259	-.3062994
lny	.5459469	.0712941	7.66	0.000	.406213	.6856808
lnpmin	.0185409	.030352	0.61	0.541	-.040948	.0780297
year	-.0487174	.0055724	-8.74	0.000	-.059639	-.0377957
state						
2	-.1229944	.0660784	-1.86	0.063	-.2525056	.0065169
3	-.3649205	.2134793	-1.71	0.087	-.7833323	.0534913
4	-.2405925	.0717201	-3.35	0.001	-.3811613	-.1000236
5	-.2086117	.0793916	-2.63	0.009	-.3642163	-.0530071
6	.1417767	.0643671	2.20	0.028	.0156194	.2679339
7	-.0337763	.1435772	-0.24	0.814	-.3151824	.2476297

8	-.0008845	.0647305	-0.01	0.989	-.1277539	.1259849
9	-.0350394	.0544958	-0.64	0.520	-.1418491	.0717703
10	-.1888756	.0569821	-3.31	0.001	-.3005584	-.0771928
_cons	5.377111	.2890047	18.61	0.000	4.810673	5.94355

```
.
.
. ****************************************************************
. *                        动态面板模型                         *
. ****************************************************************
.
. use "C:\Users\XuQi\Desktop\wagepan.dta", clear

.
. *设置为面板数据
. xtset nr year

Panel variable: nr (strongly balanced)
 Time variable: year, 1980 to 1987
         Delta: 1 unit

.
. *固定效应模型
. xtreg lwage L.lwage union married exper exper2, fe vce(robust)
```

Fixed-effects (within) regression   Number of obs   =   3,815
Group variable: nr   Number of groups =   545

R-squared: Obs per group:
     Within = 0.1440   min =   7
     Between = 0.0549   avg =   7.0
     Overall = 0.0899   max =   7

                                          F(5, 544)   =   67.60
corr(u_i, Xb) = 0.0078   Prob > F   =   0.0000

(Std. err. adjusted for 545 clusters in nr)

lwage	Coefficient	Robust std. err.	t	P>|t|	[95% conf. interval]	
lwage						
L1.	.0541724	.0228125	2.37	0.018	.0093609	.0989838
union	.0693037	.0232182	2.98	0.003	.0236954	.114912
married	.051994	.0210299	2.47	0.014	.0106842	.0933038
exper	.0944637	.0118633	7.96	0.000	.0711602	.1177671
exper2	-.0029993	.0007305	-4.11	0.000	-.0044342	-.0015644
_cons	1.061613	.0529571	20.05	0.000	.9575876	1.165638
sigma_u	.39309736					
sigma_e	.32555643					
rho	.59315971	(fraction of variance due to u_i)				

```
.
. *Arellano-Bond估计量
. xtabond lwage union married exper exper2, lags(1) twostep vce(robust)
```

Arellano–Bond dynamic panel-data estimation   Number of obs   =   3,270
Group variable: nr   Number of groups =   545
Time variable: year

                                               Obs per group:
                                                           min =   6
                                                           avg =   6
                                                           max =   6

```
Number of instruments =      26            Wald chi2(5)      =      358.64
                                           Prob > chi2       =      0.0000
Two-step results
                                   (Std. err. adjusted for clustering on nr)

             |             WC-robust
       lwage | Coefficient  std. err.      z    P>|z|     [95% conf. interval]
-------------+--------------------------------------------------------------
       lwage |
         L1. |   .1328737   .0372796     3.56   0.000     .059807    .2059403
             |
       union |   .0156335    .025376     0.62   0.538   -.0341025    .0653695
     married |   .0439858      .0227     1.94   0.053   -.0005054    .0884769
        exper|   .0601414   .0144121     4.17   0.000    .0318943    .0883886
       exper2|  -.0010929   .0008963    -1.22   0.223   -.0028496    .0006638
       _cons |   1.096868   .0641509    17.10   0.000    .9711346    1.222602
-------------+--------------------------------------------------------------
```
Instruments for differenced equation
        GMM-type: **L(2/.).lwage**
        Standard: **D.union D.married D.exper D.exper2**
Instruments for level equation
        Standard: **_cons**

.
. *设置前定变量和同期内生解释变量
. xtabond lwage exper exper2, lags(1) pre(married) endogenous(union) twostep vce(robust)

Arellano–Bond dynamic panel-data estimation   Number of obs   =   3,270
Group variable: **nr**   Number of groups =   545
Time variable: **year**
                                                Obs per group:
                                                             min =   6
                                                             avg =   6
                                                             max =   6

```
Number of instruments =      72            Wald chi2(5)      =      326.26
                                           Prob > chi2       =      0.0000
Two-step results
                                   (Std. err. adjusted for clustering on nr)

             |             WC-robust
       lwage | Coefficient  std. err.      z    P>|z|     [95% conf. interval]
-------------+--------------------------------------------------------------
       lwage |
         L1. |   .1103954   .0356815     3.09   0.002     .040461    .1803298
             |
     married |    .050656   .0363232     1.39   0.163   -.0205361    .1218482
       union |   .1346116   .0865632     1.56   0.120   -.0350492    .3042723
        exper|   .0655848   .0143476     4.57   0.000    .0374641    .0937056
       exper2|  -.0013896   .0008665    -1.60   0.109   -.0030879    .0003087
       _cons |   1.085348   .0655635    16.55   0.000    .9568455     1.21385
-------------+--------------------------------------------------------------
```
Instruments for differenced equation
        GMM-type: **L(2/.).lwage L(1/.).married L(2/.).union**
        Standard: **D.exper D.exper2**
Instruments for level equation
        Standard: **_cons**

.
. *设置工具变量最多使用的滞后期数
. xtabond lwage exper exper2, lags(1) pre(married) endogenous(union) maxldep(3) maxlags(3) twostep vce(robust)

Arellano–Bond dynamic panel-data estimation   Number of obs   =   3,270
Group variable: **nr**   Number of groups =   545
Time variable: **year**
                                                Obs per group:
                                                             min =   6
                                                             avg =   6
                                                             max =   6

```
Number of instruments =       46              Wald chi2(5)     =      341.01
                                               Prob > chi2      =      0.0000
Two-step results
                                    (Std. err. adjusted for clustering on nr)
```

lwage	Coefficient	WC-robust std. err.	z	P>|z|	[95% conf. interval]	
lwage						
L1.	.126051	.0367537	3.43	0.001	.054015	.1980869
married	.0817908	.0380035	2.15	0.031	.0073054	.1562762
union	.2055507	.0910115	2.26	0.024	.0271713	.38393
exper	.0617464	.0143044	4.32	0.000	.0337103	.0897825
exper2	-.0012091	.0008825	-1.37	0.171	-.0029388	.0005205
_cons	1.042697	.0676055	15.42	0.000	.9101923	1.175201

```
Instruments for differenced equation
        GMM-type: L(2/4).lwage L(1/3).married L(2/3).union
        Standard: D.exper D.exper2
Instruments for level equation
        Standard: _cons


.
. *检验误差项是否存在自相关
. qui xtabond lwage exper exper2, lags(1) pre(married) endogenous(union) maxldep(3) maxlags(3) twostep vce(robust) artests

. estat abond

Arellano-Bond test for zero autocorrelation in first-differenced errors
H0: No autocorrelation
```

Order	z	Prob > z
1	-6.4595	0.0000
2	1.9256	0.0541
3	-.6321	0.5273

```
.
. *检验是否所有工具变量都有效
. qui xtabond lwage exper exper2, lags(1) pre(married) endogenous(union) maxldep(3) maxlags(3) twostep

. estat sargan
Sargan test of overidentifying restrictions
H0: Overidentifying restrictions are valid

        chi2(40)    =   49.41392
        Prob > chi2 =     0.1462


.
. *使用xtdpdsys命令
. xtdpdsys lwage exper exper2, lags(1) pre(married) endogenous(union) maxldep(3) maxlags(3) twostep vce(robust)

System dynamic panel-data estimation         Number of obs    =      3,815
Group variable: nr                           Number of groups =        545
Time variable: year
                                             Obs per group:
                                                        min =          7
                                                        avg =          7
                                                        max =          7

Number of instruments =       65              Wald chi2(5)     =      348.35
                                               Prob > chi2      =      0.0000
Two-step results
```

lwage	Coefficient	WC-robust std. err.	z	P>|z|	[95% conf. interval]	
lwage						
L1.	.2324316	.0351004	6.62	0.000	.163636	.3012271
married	.1116266	.0284073	3.93	0.000	.0559494	.1673037
union	.1570422	.080435	1.95	0.051	-.0006074	.3146918
exper	.0492499	.0141985	3.47	0.001	.0214215	.0770784
exper2	-.0008968	.000909	-0.99	0.324	-.0026783	.0008848
_cons	.9225495	.0668613	13.80	0.000	.7915037	1.053595

Instruments for differenced equation
       GMM-type: **L(2/4).lwage L(1/3).married L(2/3).union**
       Standard: **D.exper D.exper2**
Instruments for level equation
       GMM-type: **LD.lwage D.married LD.union**
       Standard: **_cons**

.
. *纳入非时变变量
. xtdpdsys lwage exper exper2 black hisp educ, lags(1) pre(married) endogenous(union) maxldep(3) maxlags(3) twostep vce(ro
note: **black** omitted from **div()** because of collinearity.
note: **hisp** omitted from **div()** because of collinearity.
note: **educ** omitted from **div()** because of collinearity.

System dynamic panel-data estimation   Number of obs   =   **3,815**
Group variable: **nr**   Number of groups =   **545**
Time variable: **year**

                             Obs per group:
                                   min =   **7**
                                   avg =   **7**
                                   max =   **7**

Number of instruments =   **65**   Wald chi2(**8**)   =   **373.15**
                                 Prob > chi2   =   **0.0000**
Two-step results

lwage	Coefficient	WC-robust std. err.	z	P>|z|	[95% conf. interval]	
lwage						
L1.	.2083363	.0340778	6.11	0.000	.141545	.2751276
married	.0591983	.0292133	2.03	0.043	.0019413	.1164553
union	.1148674	.0784187	1.46	0.143	-.0388306	.2685653
exper	.0606675	.0142461	4.26	0.000	.0327456	.0885894
exper2	-.0014246	.0008918	-1.60	0.110	-.0031725	.0003234
black	-.5825586	.3609002	-1.61	0.106	-1.28991	.1247929
hisp	-.1315547	.2713542	-0.48	0.628	-.6633991	.4002897
educ	.1357544	.0898773	1.51	0.131	-.0404018	.3119106
_cons	-.5557442	1.073011	-0.52	0.605	-2.658807	1.547318

Instruments for differenced equation
       GMM-type: **L(2/4).lwage L(1/3).married L(2/3).union**
       Standard: **D.exper D.exper2**
Instruments for level equation
       GMM-type: **LD.lwage D.married LD.union**
       Standard: **_cons**

.
. *检验误差项是否存在自相关
. qui xtdpdsys lwage exper exper2, lags(1) pre(married) endogenous(union) maxldep(3) maxlags(3) twostep vce(robust) artest

. estat abond

Arellano–Bond test for zero autocorrelation in first-differenced errors
H0: No autocorrelation

Order	z	Prob > z
1	-6.9591	0.0000
2	2.693	0.0071
3	-.38028	0.7037

.
. *检验是否所有工具变量都有效

```
. qui xtdpdsys lwage exper exper2, lags(1) pre(married) endogenous(union) maxldep(3) maxlags(3) twostep

. estat sargan
Sargan test of overidentifying restrictions
H0: Overidentifying restrictions are valid

        chi2(59)    =    89.6082
        Prob > chi2  =     0.0062


.
. *模型修正
. qui xtdpdsys lwage exper exper2, lags(2) pre(married) endogenous(union) maxldep(3) maxlags(3) twostep vce(robust) artest

. estat abond

Arellano-Bond test for zero autocorrelation in first-differenced errors
H0: No autocorrelation

Order         z   Prob > z
─────────────────────────────
    1   -5.8335    0.0000
    2   -.33194    0.7399
    3    .81621    0.4144
─────────────────────────────


.
. qui xtdpdsys lwage exper exper2, lags(2) pre(married) endogenous(union) maxldep(3) maxlags(3) twostep

. estat sargan
Sargan test of overidentifying restrictions
H0: Overidentifying restrictions are valid

        chi2(53)    =    64.75773
        Prob > chi2  =     0.1291


.
. xtdpdsys lwage exper exper2, lags(2) pre(married) endogenous(union) maxldep(3) maxlags(3) twostep

System dynamic panel-data estimation      Number of obs     =      3,270
Group variable: nr                        Number of groups  =        545
Time variable: year
                                          Obs per group:
                                                        min =          6
                                                        avg =          6
                                                        max =          6

Number of instruments =       60          Wald chi2(6)      =     563.12
                                          Prob > chi2       =     0.0000
Two-step results
```

lwage	Coefficient	Std. err.	z	P>|z|	[95% conf. interval]	
lwage						
L1.	.3269879	.0250511	13.05	0.000	.2778887	.3760872
L2.	.1285275	.0180407	7.12	0.000	.0931684	.1638866
married	.1461174	.0235017	6.22	0.000	.1000549	.1921799
union	.1628679	.068009	2.39	0.017	.0295727	.2961632
exper	.0392171	.0153995	2.55	0.011	.0090347	.0693996
exper2	-.0008734	.0009354	-0.93	0.350	-.0027067	.0009599
_cons	.6147707	.0752732	8.17	0.000	.467238	.7623033

```
Warning: gmm two-step standard errors are biased; robust standard
         errors are recommended.
Instruments for differenced equation
        GMM-type: L(2/4).lwage L(1/3).married L(2/3).union
        Standard: D.exper D.exper2
Instruments for level equation
        GMM-type: LD.lwage D.married LD.union
        Standard: _cons
```

```
.
end of do-file

. log close
      name:  <unnamed>
       log:  D:\第10章.smcl
  log type:  smcl
 closed on:   5 Aug 2024, 10:07:04
```