패널 자료 분석의 방법론

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KIEP

패널 자료

- 개별단위들을 복수의 기간에 추적함
- Longitudinal data라고도 함
- 두 첨자(i, t)
- 예: 노동패널, 복지패널, 지역별 패널, 국가별 패널 등

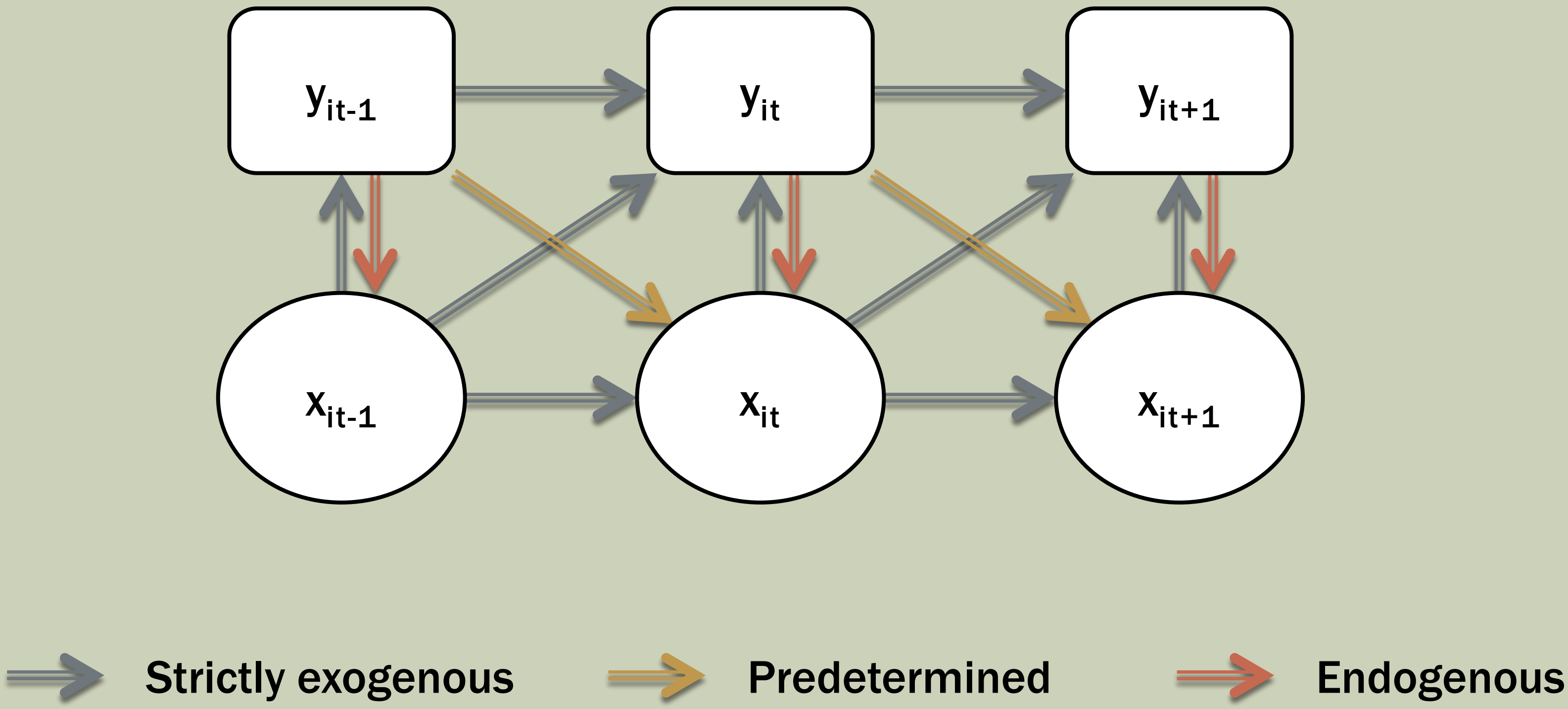
PANEL DATA SET 만들기

```
. use quarterly

. *encode countryname, gen(id)
. egen id = group(countryname)

. order id, after(countryname)

. gen time = (year-1962)*4+qtr

. order time, after(qtr)

. su id time

    Variable |       Obs        Mean    Std. Dev.       Min        Max
-------------+--------------------------------------------------------
          id |     10327    63.42549    37.13958          1        127
        time |     10327    134.6049    41.56707          1        192

. xtset id time
       panel variable:  id (unbalanced)
        time variable:  time, 1 to 192, but with gaps
                delta:  1 unit
```

선형모형

- $y_{it} = a + b*X_{it} + v_{it}$, $X_{it} = [x_{it}, z_i]$
  - X가 외생적인지 내생적인지에 따라 처리방법이 달라짐
    - 외생성의 의미?
  - v에 가정을 부여하여 모형을 다룰 수 있게 만듬
    - 설명변수의 내생성을 해결
    - 올바른 standard error를 계산
  - b가 homogenous or heterogenous?

참고: 패널 외생성과 내생성



외생적인 설명변수

- X가 strictly exogenous하면
  - Strict exogeneity는 현재의 X는 현재 및 과거의 v(즉 y에 대한 충격)와 무관함을 의미함
  - 참고
    - X가 현재의 v와 무관하고 과거의 v에 의해 영향을 받는다면 v에 대하여 "predetermined"라고 함
    - X가 현재의 v에 의해서도 영향을 받는다면(simultaneity) v에 대하여 "contemporaneously endogenous"하다고 함
- OLS (pooled OLS)는 unbiased/consistent함
- 두 가지 issue
  - Standard error의 계산
  - GLS

외생적인 X에서 OLS 표준오차

- Conventional
  - i간에는 독립(이분산적일 수 있음), 동일한 i내에서는 임의의 자기상관이 존재할 수 있는 것으로 가정함
  - reg y x1 x2, vce(cluster id)
  - 주의: “robust” 옵션은 동일한 i 내에서도 자기상관이 없음을 가정하는 것임
- Cross sectionally dependent errors: xtpcse, c(i); xtscc
  - “xtpcse, i c(i) nmk” = “reg”
  - “xtpcse, het c(i)”은 동일 i내에서 iid이고 i간에 het임을 가정. “reg, robust” (모든 i와 t에서 het) 와 다름
  - xtscc: Newey-West의 패널 버전

외생적인 X에서 OLS 표준오차

```
est tab ols ols_r ols_c pcse_i pcse_h pcse scc, b(%6.4f) se stats(N r2_a)
```

Variable	ols	ols_r	ols_c	pcse_i	pcse_h	pcse	scc
vg_port_gdp	0.0460	0.0460	0.0460	0.0460	0.0460	0.0460	0.0460
	0.0271	0.0521	0.1180	0.0269	0.0350	0.0566	0.0604
vg_kaopen~d	1.5935	1.5935	1.5935	1.5935	1.5935	1.5935	1.5935
	0.1969	0.1919	0.5392	0.1960	0.1871	0.2273	0.2437
vg_TradeO~n	1.2894	1.2894	1.2894	1.2894	1.2894	1.2894	1.2894
	0.1492	0.1838	0.3378	0.1485	0.1739	0.2314	0.3239
avg_infl	0.1496	0.1496	0.1496	0.1496	0.1496	0.1496	0.1496
	0.0411	0.0374	0.0274	0.0409	0.0372	0.0441	0.0417
vg_GDPgro~h	-0.0756	-0.0756	-0.0756	-0.0756	-0.0756	-0.0756	-0.0756
	0.0286	0.0257	0.0563	0.0285	0.0251	0.0448	0.0358
d_GDPgrowth	0.0358	0.0358	0.0358	0.0358	0.0358	0.0358	0.0358
	0.0349	0.0349	0.0699	0.0348	0.0323	0.0411	0.0353
vg_Reserv~s	-0.0484	-0.0484	-0.0484	-0.0484	-0.0484	-0.0484	-0.0484
	0.0244	0.0197	0.0462	0.0243	0.0208	0.0152	0.0328
_cons	0.4315	0.4315	0.4315	0.4315	0.4315	0.4315	0.4315
	0.2474	0.2506	0.5479	0.2463	0.2548	0.3704	0.7177
N	882	882	882	882	882	882	882
r2_a	0.1898	0.1898	0.1898				

legend: b/se

외생적인 X에서 GLS

- xtgls
  panels(iid), panels(het), panels(cor)
  corr(indep), corr(ar1), corr(psar1)
  - “xtgls $Y $X, p(i) c(i)” = “reg $Y $X”
  - p(c): need balanced panel
  - c(a), c(p): need regularly spaced panel; * ‘force’ option
  - p(c)를 사용하려면 T가 N보다 커야 함
- xtregar: $v_{it} = u_i + e_{it}$, e_{it}~common AR(1)
  - “fixed effects”에서도 사용가능
- xtpcse
  - “xtpcse, i c(i|a|p) rho(dw)” = “xtgls, p(i) c(i|a|p) rho(dw)”
  - “c” option은 추정값에 영향을 미치지 않음

XTGLS와 XTPCSE 예

	xtgls			xtpcse			
t\i	i	het	cor	i	het	cor	i/t
ind	.1156 (.0058)	.1116 (.0050)	.1128 (.0022)	.1156 (.0058)	.1156 (.0071)	.1156 (.0072)	ind
ar1	.0938 (.0077)	.0715 (.0087)	.0827 (.0063)	.0950 (.0076)	.0950 (.0131)	.0950 (.0130)	ar1
psar1	.0966 (.0076)	.0716 (.0082)	.0846 (.0057)	.0962 (.0076)	.0962 (.0134)	.0962 (.0136)	psar1

rho 계산 방식의 차이

ERROR COMPONENT MODEL

- 특별한 경우
  - $v_{it} = u_i + e_{it}$ 이며 u와 e가 독립
  - 또한 e가 i와 t에 걸쳐 iid
- 이 경우 더욱 sharp한 FGLS가 가능함
- xtreg y x1 x2, re
- Historically, "random effects estimator"라고 함
- 만일 가정이 맞다면 N, T의 크기와 관계없이 efficient함
- NT가 크면 FGLS임에도 불구하고 bias가 매우 작음
- 가정이 맞지 않으면 일반적으로 cluster standard error 사용
- xtreg y x1 x2, re vce(r)   이는 vce(cluster id)와 동일
  참고: reg y x1 x2, vce(r)은 vce(cluster id)와 다름

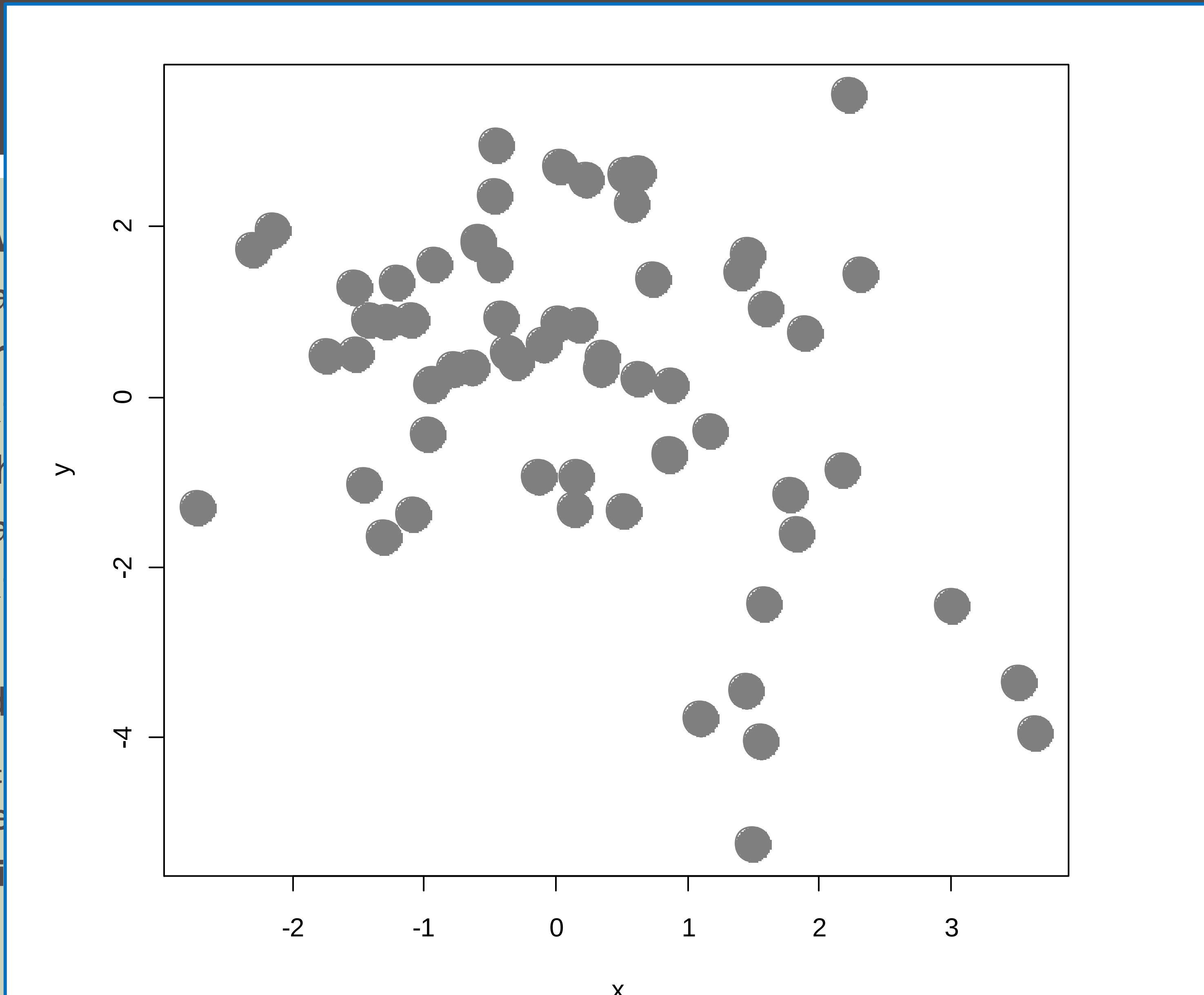
요점

- 지금까지 설명변수가 엄밀히 외생적인 경우만을 다룸
- 다음에는 설명변수가 내생적인(오차항과 상관있는) 경우를 다룸
  - beta 계수가 의미하는 바는?
  - OLS, GLS 모두 biased and inconsistent
  - xtpcse, xtgls, “xtreg, re” 모두 우리가 원하는 것과 다른 정보를 줌

BETWEEN과 WITHIN

- Between group
  - Variation across *i*
  - Cross-sectional
  - “xtreg, be”
- Within group
  - Variation within *i* over *t*
  - “xtreg, fe”
  - = LSDV (i.e., individual dummies)
- Model
  - $y_{it} = a + b*x_{it} + c*z_i + u_i + e_{it}$
  - between: $ybar_i = a + b*xbar_i + c*z_i + vbar_i$
  - within: $y_{it} – ybar_i = b*(x_{it} – xbar_i) + (e_{it} – ebar_i)$

- Betw
  - Va
  - Cr
  - “x
- With
  - Va
  - “x
  - =
- Mod
  - y_{it}
  - be
  - wi



- Betw
  - Va
  - Cr
  - “x
- With
  - Va
  - “x
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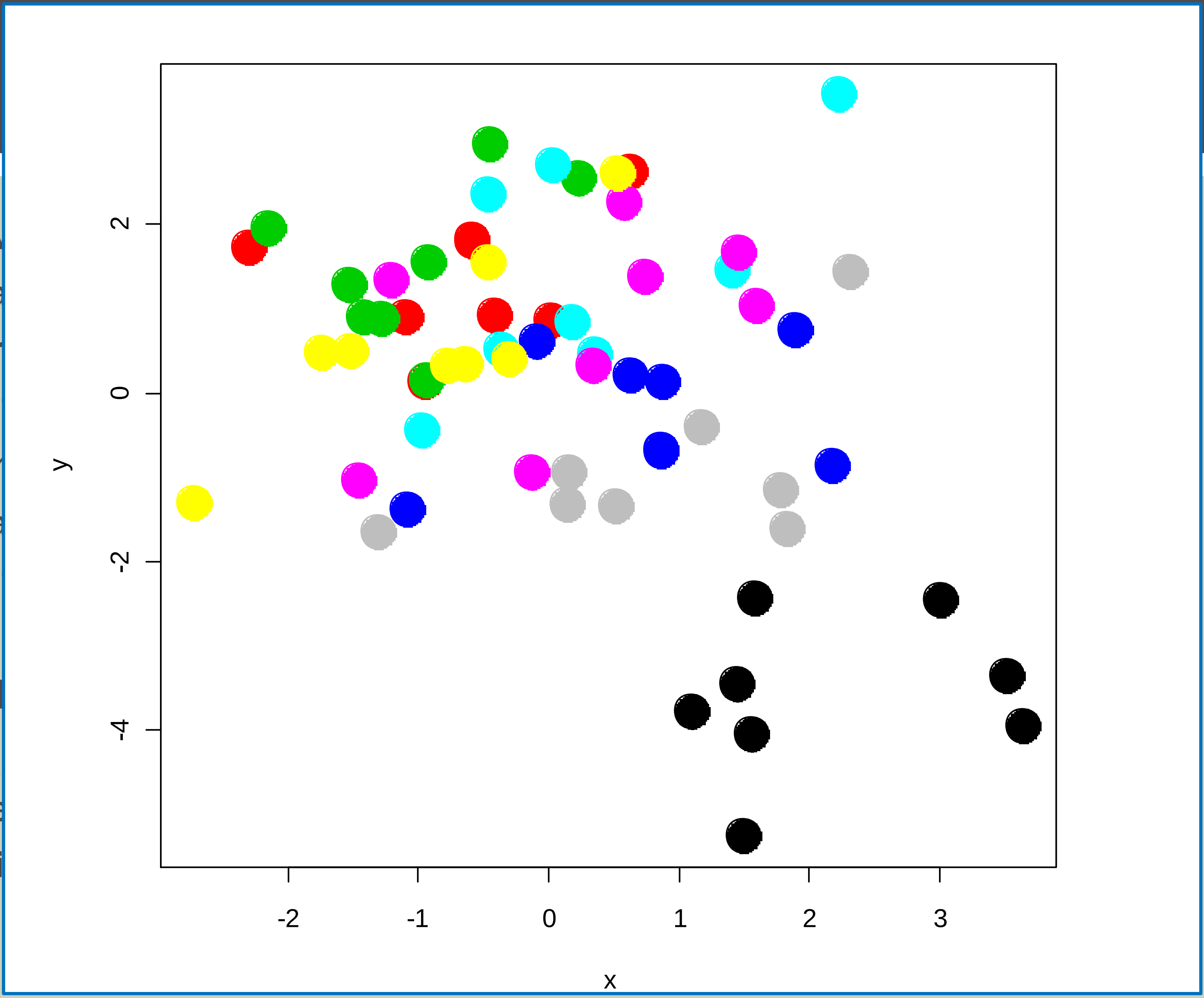

- Betw
  - Va
  - Cr
  - “x
- With
  - Va
  - “x
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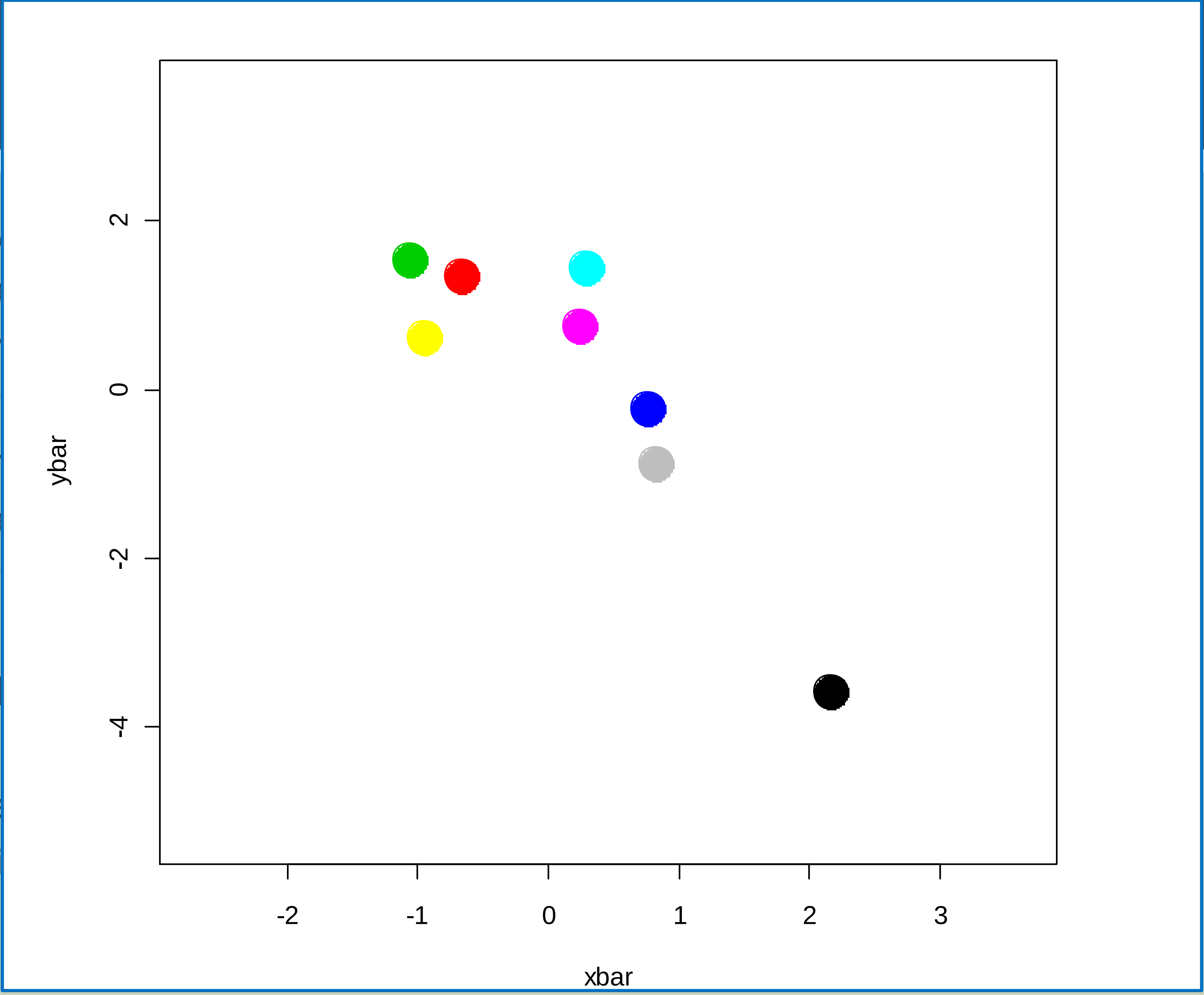
  - be
  - wi



- Betw
  - Va
  - Cr
  - “x
- With
  - Va
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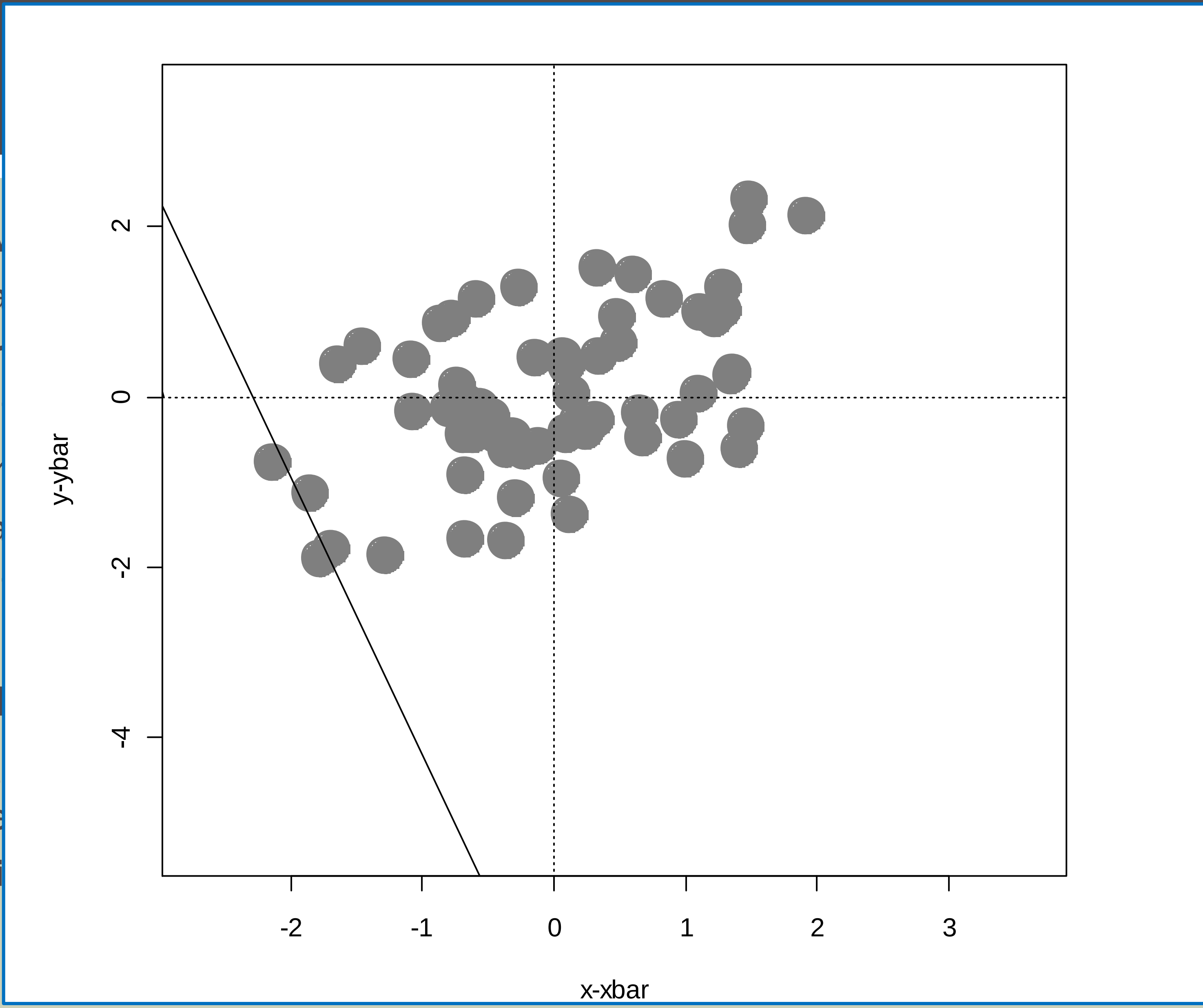
  - wi



BE, FE & RE

- BE: Between group
  xtreg y x1 x2, be
  reg ybar x1bar x2bar
- FE: Within group
  xtreg y x1 x2, fe
  reg yd x1d x2d   /* within-group */
  reg y x1 x2 i.id   /* LSDV */
- RE: Somewhere in between
  xtreg y x1 x2, re

BE, FE & RE

- BE: Between group
  xtreg y
  reg yba
- FE: Wit
  xtreg y
  reg yd
  reg y x
- RE: So
  xtreg y

```
. est tab be fe re, b se t p stat(N r2_a)
```

Variable	be	fe	re
x	-1.3755771	.50624442	.2780045
	.31952257	.11870924	.13516773
	-4.31	4.26	2.06
	0.0051	0.0001	0.0397
_cons	.39733363	.00631462	.05374002
	.33110716	.11468618	.3950233
	1.20	0.06	0.14
	0.2754	0.9563	0.8918
N	64	64	64
r2_a	.71468049	.13918665	

legend: b/se/t/p

WHY DIFFERENT?

- y에 내재하는 time-invariant factor 와 X에 내재하는 time-invariant factor가 서로 관련될 수 있기 때문
- X와 u 사이에 cross-sectional correlation이 존재하기 때문
- “Between”은 이러한 time-invariant factor들 간의 cross-sectional relationship을 capture함
- “Within”은 각 개별단위(i)가 시간에 걸쳐 변화할 때 X와 y의 변화량들이 어떠한 관계를 갖느냐를 capture함

HAUSMAN TEST

- Test(“be”와 “fe”의 동일성): FE와 RE를 비교하는 Hausman test
  - xtreg y x, fe
    est store *fixed*
    xtreg y x, re
    hausman *fixed* ., sigmamore [or sigmaless]

```
. hausman fe re, sig

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |       fe           re         Difference          S.E.
-------------+----------------------------------------------------------------
           x |   .5062444     .2780045        .2282399        .0502176
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(1) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       20.66
                Prob>chi2 =      0.0000
```

유의할 점

- FE는 time-invariant regressor (z_i)의 계수를 추정할 수 없음
  - Within-group variation이 없기 때문
  - 이를 해결하기 위해서는
    - Time-invariant omitted variables (u_i)의 proxy를 많이 포함시키고 RE를 함
    - u_i는 결국 omitted variables이므로 IV 사용
    - 만일 z_i가 exogenous하다면 FE 이후에 패널별 평균으로 regression. 예:

```
xtreg y x, fe
predict w, ue
xtreg w z, be
```

$$y_{it} = \beta' x_{it} + \gamma' z_i + u_i + \varepsilon_{it}$$

$$w_{it} = y_{it} - \beta' x_{it} = \gamma' z_i + u_i + \varepsilon_{it}$$

$$\bar{w}_i = \gamma' z_i + (u_i + \bar{\varepsilon}_i)$$

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      ```
      xtreg y x, fe
      predict w, ue
      xtreg w z, be
      ```
    - z_i의 일부가 endogenous할 때 x_{it} 중 exogenous한 것이 충분히 있으면 IV가 가능 (Hausman & Taylor 1981)

HAUSMAN AND TAYLOR

- 설명변수 X_{it} = [$x1_{it}$, $x2_{it}$, $z1_i$, $z2_i$],   오차항 $v_{it} = u_i + e_{it}$
- coeff = (b1,b2,c1,c2)
- X는 e와 무관(e에 대하여 strictly exogenous)
- x는 time-varying, z는 time-invariant
- (x1,z1)은 u와 uncorrelated, (x2,z2)는 u와 correlated
- b1, b2는 FE에 의하여 추정할 수 있음
- z2 때문에 그 다음에 c1,c2는 직접적 추정불가
- z2의 IV로서 $x1bar_i$를 사용함
- xthtaylor y x1 z1, endog (x2 z2)

- 설명
- coef
- X는 e
- x는 t
- (x1,z
- b1, b
- z2 때
- z2의
- xtht

```
. xthtaylor lwage occ south smsa ind exp exp2 wks ms union fem blk ed,
> endog(exp exp2 wks ms union ed)

Hausman-Taylor estimation                      Number of obs      =      4165
Group variable: id                             Number of groups   =       595

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

Random effects u_i ~ i.i.d.                    Wald chi2(12)      =   6891.87
                                               Prob > chi2        =    0.0000

------------------------------------------------------------------------------
       lwage |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
TVexogenous  |
         occ |  -.0207047   .0137809    -1.50   0.133    -.0477149    .0063055
       south |   .0074398    .031955     0.23   0.816    -.0551908    .0700705
        smsa |  -.0418334   .0189581    -2.21   0.027    -.0789906   -.0046761
         ind |   .0136039   .0152374     0.89   0.372    -.0162608    .0434686
TVendogenous |
         exp |   .1131328    .002471    45.79   0.000     .1082898    .1179758
        exp2 |  -.0004189   .0000546    -7.67   0.000    -.0005259   -.0003119
         wks |   .0008374   .0005997     1.40   0.163    -.0003381    .0020129
          ms |  -.0298508     .01898    -1.57   0.116    -.0670508    .0073493
       union |   .0327714   .0149084     2.20   0.028     .0035514    .0619914
TIexogenous  |
         fem |  -.1309236    .126659    -1.03   0.301    -.3791707    .1173234
         blk |  -.2857479   .1557019    -1.84   0.066    -.5909179    .0194221
TIendogenous |
          ed |    .137944   .0212485     6.49   0.000     .0962977    .1795902
             |
       _cons |   2.912726   .2836522    10.27   0.000     2.356778    3.468674
-------------+----------------------------------------------------------------
     sigma_u |  .94180304
     sigma_e |  .15180273
         rho |  .97467788   (fraction of variance due to u_i)
------------------------------------------------------------------------------
Note:  TV refers to time varying; TI refers to time invariant.
```

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      ```
      xtreg y x, fe
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      ```
    - z_i의 일부가 endogenous할 때 x_{it} 중 exogenous한 것이 충분히 있으면 IV가 가능 (Hausman & Taylor 1981)
- 설명변수의 외생성
  - $v_{it}=u_i+e_{it}$일 때, X와 v는 상관될 수 있으나 X와 e는 모든 시간에 걸쳐 독립
  - 현재의 X가 과거의 e에 의해서도 영향을 받지 않음
  - 모든 endogeneity는 시간불변의 요소(u_i)에 기인함

용어 및 요점 정리

- u_i
  - 설명변수와 무관: random effects
  - 설명변수와 상관: fixed effects
- e_{it}와의 관계
  - Exogenous: $Ex_{is}e_{it}=0$ for all s and t
  - Predetermined: $Ex_{is}e_{it}=0$ for $s \le t$
  - Endogenous: $Ex_{is}e_{it}=0$ for $s<t$

Note: $Ex_{is}e_{it} \neq 0$ for all s, t?

- Stata commands
  - "xtgls", "xtpcse", "xtreg, re": exogenous regressors + random effects
  - "xtreg, fe": TV exogenous regressors + ramdom or fixed effects
    Note: "xtregar" = FE GLS with large T under AR(1) assumption for e
  - "xthtaylor": TV and TI exogenous regressors + random or fixed effects
- Predetermined or endogenous regressors? A: DPD

DYNAMIC PANEL DATA MODELS

- $y_{it} = a + d*y_{it-1} + b*X_{it} + u_i + e_{it}$
- $X = [x1, x2, x3]$
  - x1: exogenous
  - x2: predetermined
  - x3: endogenous
- u_i: fixed effects
- Estimation
  - No RE available
  - Within + OLS/GLS: Biased and inconsistent unless T large + N small
  - xtpcse, xtgls, xtreg, xthtaylor, xtregar, etc., are all useless.

DIFFERENCE GMM FOR DPD

- FD & write the equation in terms of changes (in order to eliminate fixed effects)
- Transformed error is Δe[it] = e[it] – e[it-1]
- Arellano and Bond (1991): Instruments =
  - x1[i1], …, x1[iT]
  - x2[i1], …, x2[it-1]
  - x3[i1], …, x3[it-2]
  - y[i1], …, y[it-2]
- Stata
  - xtabond y l(0/1).x1, pre(x2) endo(x3) lags(2) vce(r)

PERSISTENT PANELS AND SYSTEM GMM

- For panel AR(1), if the AR coefficient is close to 1 (persistent), different GMM suffers from weak instrument problem.
- To solve this, assume that the system was initialized long time ago. (Has reached stationarity if not integrated.)
- A solution: System GMM
  - Difference GMM: Differenced equation + levels instruments
  - Levels GMM: Levels equation + differenced instruments
    - $y_{it} = d*y_{it-1} + u_i + e_{it}$, IV: $\Delta y_{i2}, \ldots, \Delta y_{it-1}$ if Δy_{is} consists of $e_{is}, e_{is-1}, \ldots$ only.
- Stata
  - xtdpdsys y l(0/1).x1, pre(x2) endo(x3) lags(2)

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    - $y_{it} = d*y_{it-1} + u_i + e_{it}$, IV: $\Delta y_{i2}, \ldots, \Delta y_{it-1}$ if Δy_{is} consists of $e_{is}, e_{is-1}, \ldots$ only.
- Stata
  - xtdpdsys y l(0/1).x1, pre(x2) endo(x3) lags(2)

TESTS

- Over-identification test (Sargan test)
  - Test the validity of instruments
  - Should accept the null hypothesis
  - xtabond … [, two]
    estat sargan
  - If rejected, decrease AR order or blame heteroskedasticity.
  - Hansen's J test if heteroskedastic. Install xtabond2.
- AR order test (Arellano-Bond test)
  - Test that Δe[it] is not autocorrelated.
  - Should reject H0 for lag=1, accept H0 for lag>1.
  - "xtabond …, two" or "xtabond …, vce(r)"
    estat abond
  - If you don't get "reject for lag=1, accept for lag>1", increase AR order.

TESTS

```
. qui xtabond y x1, pre(x2) endo(x3)
. estat sargan
Sargan test of overidentifying restrictions
        H0: overidentifying restrictions are valid

        chi2(56)      =   95.2558
        Prob > chi2   =    0.0008

. qui xtabond y x1, pre(x2) endo(x3) vce(r)
. estat abond
artests not computed for one-step system estimator with vce(gmm)

Arellano-Bond test for zero autocorrelation in first-differenced errors
  +-----------------------+
  |Order |  z      Prob > z|
  |------+----------------|
  |   1  |-4.4889  0.0000 |
  |   2  |-.89204  0.3724 |
  +-----------------------+
   H0: no autocorrelation
```

r.

MODELS WITH NO LAGGED DEP VARS

- What if there are no lagged dependent variables?
- $y_{it} = a + b1*x1_{it} + b2*x2_{it} + b3*x3_{it} + u_i + e_{it}$
- "xtabond" and "xtdpdsys" are for models with y[it-1], …, y[it-p].
- "xtabond y x, lags(0)" does not work.
- Use the raw command "xtdpd":
  xtdpd y x1 x2 x3, div(x1) dgmmiv(x2,lag(1 .)) dgmmiv(y x3)
- But before that, think more carefully about your model.
  - Is e serially independent?
  - What's the meaning of being predetermined if not?

PRACTICAL ISSUES

- Time dummies or linear time trends?
  - Include time <u>dummies</u> to control for global business cycles.
- Consider levels or growth rates?
  - Consider growth if incidental trends are present in levels. (Differencing converts trends to levels.)
  - Compare and doubt.
- How to determine exo/pre/endo?
  - Time dummies are exogenous.
  - Hard to find exogenous regressors if they are results of economic optimization.
  - If specify as “pre” but the truth is “endo”, estimator is inconsistent.
  - If specify as “endo” when the truth is “pre”, estimator is still consistent but can be wild.

AB1, AB2, SYS1 OR SYS2

- Difference GMM (xtabond) or System GMM (xtdpdsys)?
  - System GMM requires stronger conditions for consistency.
  - Use difference GMM unless AR coefficient is close to 1.
- One step (default) or two step (two)?
  - Two step is efficient according to large sample theory.
  - But one step performs better for usual cases.
  - Recommend: One step + robust inference

FACTORS

- $X_{it} = (a_{1i}*f_{1t}+a_{2i}*f_{2t}+\ldots+a_{ri}*f_{rt}) + e_{it}$
- f: common factors, a: factor loading (all unobserved)
- Use eigenvector decomposition to estimate common factors
- Application: FAVAR
  - Find a few number of important factors from a large number of variables.
  - Augment the regression with the factors
  - Dimension reduction

REGRESSION WITH FACTORS

- $y_{it} = c_{it} + b*X_{it} + e_{it}$, $c_{it} = a_{1i}*f_{1t} + a_{2i}*f_{2t} + \ldots + a_{ri}*f_{rt}$
- $f_{1t}=1$ (individual effects), $a_{2i}=1$ (common time effects)
- No Stata module available.
- Simple 1:
  - Remove factors from both y and X
  - Run panel regression using residuals
  - Greenaway et al. (2012)
- Simple 2:
  - Pesaran's (2006) CCE
  - Include cross-sectional averages for all variables for all t
- Least squares: Bai (2009)

EXAMPLE

```
set more off
use forreg, clear

xtset countryname_num year

local myvar “fdi”  // port | other
global Y sd_`myvar’_gdp
global X avg_`myvar’_gdp avg_kaopen_std avg_TradeOpen ///
          avg_infl avg_GDPgrowth sd_GDPgrowth avg_ReserveImports

xtscc ${Y} ${X}, lag(5)
xtscc ${Y} ${X}, fe lag(5)
xtreg l(0/2).${Y} ${X}, fe vce(r)
xtreg l(0/2).${Y} ${X} i.year, fe vce(r)
xtdpd l(0/2).${Y} ${X} dum_year*, dgmmiv(${Y} ${X}, lag(11 .)) div(dum_year*) vce(r)
```

EXAMPLE

set mo

fdi | port | other

Variable	ls_notscc	fe_notscc	fe_not	fe	dpd
sd_fdi_gdp					
L1.			0.9996***	0.8707***	0.8282***
L2.			-0.1612***	-0.1856***	-0.1671***
avg_fdi_gdp	0.0737	-0.0437	-0.0073	-0.0265	-0.0390
avg_kaopen~d	0.8483***	1.0221***	0.1143	-0.0468	0.0837
avg_TradeO~n	1.0692***	1.7706***	0.1561***	-0.4612	0.1972
avg_infl	0.0161	-0.0390	0.0003	-0.0057	-0.0070
avg_GDPgro~h	-0.0466**	-0.0480*	-0.0058	0.0060	-0.0066
sd_GDPgrowth	0.0283**	-0.0010	0.0039	0.0123	-0.0063
avg_Reserv~s	-0.0248	-0.0077	-0.0092	-0.0095	-0.0187

legend: * p<0.05; ** p<0.01; *** p<0.001

EXAMPLE

set mo[…] | fdi | port | other

Variable	ls_notscc	fe_notscc	fe_not	fe	dpd
sd_port_gdp					
L1.			0.9763***	0.8412***	0.8005***
L2.			-0.0593	-0.0615	-0.0489
avg_port_gdp	0.0460	0.1249*	0.0109	0.0197	0.0825**
avg_kaopen~d	1.5935***	2.1352***	0.2754*	-0.0983	0.0605
avg_TradeO~n	1.2894***	3.9601***	0.3082***	-0.1359	1.7060**
avg_infl	0.1496**	0.1204**	0.0632***	0.0788***	0.0654***
avg_GDPgro~h	-0.0756*	-0.0032	-0.0169	0.0180	0.0067
sd_GDPgrowth	0.0358	0.0634	0.0078	0.0796*	0.0760
avg_Reserv~s	-0.0484	-0.0780**	-0.0069	-0.0367	-0.0301

legend: * p<0.05; ** p<0.01; *** p<0.001

EXAMPLE

set mo[…] | fdi | port | other

Variable	ls_notscc	fe_notscc	fe_not	fe	dpd
sd_other_gdp					
L1.			0.9410***	0.8762***	0.7945***
L2.			-0.1166***	-0.1323**	-0.1419**
avg_o~er_gdp	0.0479	0.0023	0.0333*	0.0431	-0.0294
avg_kaopen~d	0.8440**	1.2684***	0.2599**	0.1540	-0.1453
avg_TradeO~n	1.9394***	1.3332**	0.3690***	0.0633	0.8990
avg_infl	0.0985**	0.0676	0.0424***	0.0397*	0.0131
avg_GDPgro~h	-0.0467	0.0113	-0.0242	-0.0108	-0.0765*
sd_GDPgrowth	0.1648***	0.1862***	0.0426	0.1067*	0.0921
avg_Reserv~s	0.0646**	0.0397*	0.0274**	0.0273	0.0144

legend: * p<0.05; ** p<0.01; *** p<0.001