```
'''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''
'
'   This program produces the results of the Bank of Canada 2022 Staff Discussion Paper 'CALCULATING EFFECTIVE DEGREES OF FREEDOM FOR FORECAST COMBINATIONS AND ENSEMBLE MODELS' by James Younker
'
'   The program is to be run in EViews.  It was developed on EViews 11 but should work in most if not all later versions of EViews.
'
'   Before executing the program set an output directory.  By default the program uses 'c:\data\sim\sim4' which is referred to in four places below.
'
'   When running the program please select 'quiet mode' to reduce run time.
'
'   Please note that the program's run time is around 5 hours in quiet mode.
'
'   The program output used in figure 1 of the discussion paper is as follows:
'           2 Models With 2 Variables Each: work file 'var2_obs100' variable for EDF from Equation 19 'ave_ratio_cp1' variable for EDF with naive measure 'ave_ratio_cp2'
'           3 Models With 3 Variables Each: work file 'var2_obs100' variable for EDF from Equation 19 'ave_ratio_cp1' variable for EDF with naive measure 'ave_ratio_cp2'
'           5 Models With 5 Variables Each: work file 'var2_obs100' variable for EDF from Equation 19 'ave_ratio_cp1' variable for EDF with naive measure 'ave_ratio_cp2'
'           10 Models With 10 Variables Each: work file 'var2_obs100' variable for EDF from Equation 19 'ave_ratio_cp1' variable for EDF with naive measure 'ave_ratio_cp2'
'
'
'
'''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''


rndseed 123456


wfcreate(wf=var2_obs25) u 25
wfcreate(wf=var2_obs50) u 50
```

```
wfcreate(wf=var2_obs100) u 100

wfcreate(wf=var2_obs200) u 200

wfcreate(wf=var2_obs1000) u 1000


wfcreate(wf=var3_obs25) u 25

wfcreate(wf=var3_obs50) u 50

wfcreate(wf=var3_obs100) u 100

wfcreate(wf=var3_obs200) u 200

wfcreate(wf=var3_obs1000) u 1000


wfcreate(wf=var5_obs25) u 25

wfcreate(wf=var5_obs50) u 50

wfcreate(wf=var5_obs100) u 100

wfcreate(wf=var5_obs200) u 200

wfcreate(wf=var5_obs1000) u 1000


wfcreate(wf=var10_obs25) u 25

wfcreate(wf=var10_obs50) u 50

wfcreate(wf=var10_obs100) u 100

wfcreate(wf=var10_obs200) u 200

wfcreate(wf=var10_obs1000) u 1000



''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''' 2x2 models


for %v 25 50 100 200 1000

'Step one create an unstructured workfile with the desired number of observations you want to use.


wfselect var2_obs{%v}
```

```
scalar obs={%v}              'insert number of observations
scalar obs_l1=obs-1

vector(100000) errors_new
vector(100000) errors_new_squared
vector(100000) errors_new_rootsquared
vector(100000) errors_new_squared_est1
vector(100000) errors_new_squared_est2

vector(100000) err_est1_diff
vector(100000) err_est2_diff

vector(100000) b1_new
vector(100000) b2_new

vector(2) q=1    'constraint for weighting scheme OLS
scalar one=1     'constraint for weighting scheme OLS

scalar num_aux=2                'number of auxiliary models
scalar aux_parm=3               'parameters in auxiliary models
scalar weight_parm=1             ' parameters in weighting scheme

scalar dof_est=1*aux_parm+weight_parm                    'effective degrees of freedom as proposed by paper
scalar dof_naive=num_aux*aux_parm+weight_parm          'naive degrees of freedom counting parameters

for !i=1 to 100000

'Create data
```

```
series common=nrnd

series x1info=1                                         'constant
vector x1full=x1info
vector(obs_l1) x1= @subextract(x1full,1,1,obs_l1,1)

series x2diff=nrnd
series x2info=(0.8^0.5)*common+(0.2^0.5)*x2diff
vector x2full=x2info
vector(obs_l1) x2= @subextract(x2full,1,1,obs_l1,1)

series x3diff=nrnd
series x3info=(0.8^0.5)*common+(0.2^0.5)*x3diff
vector x3full=x3info
vector(obs_l1) x3= @subextract(x3full,1,1,obs_l1,1)

series x4info=1                     'constant
vector x4full=x4info
vector(obs_l1) x4= @subextract(x4full,1,1,obs_l1,1)

series x5diff=nrnd
series x5info=(0.8^0.5)*common+(0.2^0.5)*x5diff
vector x5full=x5info
vector(obs_l1) x5= @subextract(x5full,1,1,obs_l1,1)

series x6diff=nrnd
series x6info=(0.8^0.5)*common+(0.2^0.5)*x6diff
vector x6full=x6info
```

```
vector(obs_l1) x6= @subextract(x6full,1,1,obs_l1,1)



series yerr=nrnd
vector yfull=0.25*x2info+0.25*x3info+0.25*x5info+0.25*x6info+yerr    'same level of information for each case
vector(obs_l1) y= @subextract(yfull,1,1,obs_l1,1)

matrix(obs_l1,6) x
matplace(x,x1,1,1)
matplace(x,x2,1,2)
matplace(x,x3,1,3)
matplace(x,x4,1,4)
matplace(x,x5,1,5)
matplace(x,x6,1,6)

'new betas

matrix(obs_l1,3) x_part1
matplace(x_part1,x1,1,1)
matplace(x_part1,x2,1,2)
matplace(x_part1,x3,1,3)

matrix(obs_l1,3) x_part2
matplace(x_part2,x4,1,1)
matplace(x_part2,x5,1,2)
matplace(x_part2,x6,1,3)

vector bols_part1= @inverse(@transpose(x_part1)*x_part1)*@transpose(x_part1)*y
```

```
vector bols_part2= @inverse(@transpose(x_part2)*x_part2)*@transpose(x_part2)*y

matrix x_beta_part1=x_part1*bols_part1
matrix x_beta_part2=x_part2*bols_part2

matrix(obs_l1,2) x_ave
matplace(x_ave,x_beta_part1,1,1)
matplace(x_ave,x_beta_part2,1,2)

vector bols_ave= @inverse(@transpose(x_ave)*x_ave)*@transpose(x_ave)*y      'unconstrained
vector cbols_ave= bols_ave-(@transpose(x_ave)*x_ave)*q*@inverse(@transpose(q)*(@transpose(x_ave)*x_ave)*q)*(@transpose(q)*bols_ave-one)    'constrained


vector(6) bnew
bnew(1)=cbols_ave(1)*bols_part1(1)
bnew(2)=cbols_ave(1)*bols_part1(2)
bnew(3)=cbols_ave(1)*bols_part1(3)
bnew(4)=cbols_ave(2)*bols_part2(1)
bnew(5)=cbols_ave(2)*bols_part2(2)
bnew(6)=cbols_ave(2)*bols_part2(3)

b1_new(!i)=bnew(1)
b2_new(!i)=bnew(2)

'compute insample residuals
vector new_resids=x*bnew-y
scalar new_sqresids=@transpose(new_resids)*new_resids
```

'compute out of sample errors

scalar errornew=yfull(obs)-(x1full(obs)*bnew(1)+x2full(obs)*bnew(2)+x3full(obs)*bnew(3)+x4full(obs)*bnew(4)+x5full(obs)*bnew(5)+x6full(obs)*bnew(6))

errors_new(!i)=errornew

errors_new_squared(!i)=errornew*errornew

errors_new_rootsquared(!i)=(errornew*errornew)^0.5

errors_new_squared_est1(!i)=new_sqresids/obs_l1+2*dof_est*1/obs_l1 'Mallows Cp estimate using FC DoF

errors_new_squared_est2(!i)=new_sqresids/obs_l1+2*dof_naive*1/obs_l1 'Mallows Cp estimate using simple parameter count

err_est1_diff(!i)=errors_new_squared(!i)-errors_new_squared_est1(!i)

err_est2_diff(!i)=errors_new_squared(!i)-errors_new_squared_est2(!i)

next

scalar ave_err_new_sq=@mean(errors_new_squared)

scalar ave_cp1=@mean(errors_new_squared_est1)

scalar ave_cp2=@mean(errors_new_squared_est2)

scalar ave_ratio_cp1=ave_cp1/ave_err_new_sq

scalar ave_ratio_cp2=ave_cp2/ave_err_new_sq

wfsave(2) c:\data\sim\sim4\var2_obs{%v}

next

```
''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''' 3x3 models



for %v 25 50 100 200 1000
'Step one create an unstructured workfile with the desired number of observations you want to use.

wfselect var3_obs{%v}

scalar obs={%v}        'insert number of observations
scalar obs_l1=obs-1

vector(100000) errors_new
vector(100000) errors_new_squared
vector(100000) errors_new_rootsquared
vector(100000) errors_new_squared_est1
vector(100000) errors_new_squared_est2

vector(100000) err_est1_diff
vector(100000) err_est2_diff

vector(100000) b1_new
vector(100000) b2_new
vector(100000) b3_new


vector(3) q=1    'constraint for weighting scheme OLS
scalar one=1     'constraint for weighting scheme OLS
```

```
scalar num_aux=3                'number of auxiliary models
scalar aux_parm=4               'parameters in auxiliary models
scalar weight_parm=2            ' parameters in weighting scheme

scalar dof_est=1*aux_parm+weight_parm                   'effective degrees of freedom as proposed by paper
scalar dof_naive=num_aux*aux_parm+weight_parm           'naive degrees of freedom counting parameters


for !i=1 to 100000

'Create data

series common=nrnd

series x1info=1                                         'constant
vector x1full=x1info
vector(obs_l1) x1= @subextract(x1full,1,1,obs_l1,1)

series x2diff=nrnd
series x2info=(0.8^0.5)*common+(0.2^0.5)*x2diff
vector x2full=x2info
vector(obs_l1) x2= @subextract(x2full,1,1,obs_l1,1)

series x3diff=nrnd
series x3info=(0.8^0.5)*common+(0.2^0.5)*x3diff
vector x3full=x3info
vector(obs_l1) x3= @subextract(x3full,1,1,obs_l1,1)

series x4diff=nrnd
```

```
series x4info=(0.8^0.5)*common+(0.2^0.5)*x4diff
vector x4full=x4info
vector(obs_l1) x4= @subextract(x4full,1,1,obs_l1,1)


series x5info=1                    'constant
vector x5full=x5info
vector(obs_l1) x5= @subextract(x5full,1,1,obs_l1,1)

series x6diff=nrnd
series x6info=(0.8^0.5)*common+(0.2^0.5)*x6diff
vector x6full=x6info
vector(obs_l1) x6= @subextract(x6full,1,1,obs_l1,1)

series x7diff=nrnd
series x7info=(0.8^0.5)*common+(0.2^0.5)*x7diff
vector x7full=x7info
vector(obs_l1) x7= @subextract(x7full,1,1,obs_l1,1)

series x8diff=nrnd
series x8info=(0.8^0.5)*common+(0.2^0.5)*x8diff
vector x8full=x8info
vector(obs_l1) x8= @subextract(x8full,1,1,obs_l1,1)


series x9info=1                    'constant
vector x9full=x9info
vector(obs_l1) x9= @subextract(x9full,1,1,obs_l1,1)
```

```
series x10diff=nrnd
series x10info=(0.8^0.5)*common+(0.2^0.5)*x10diff
vector x10full=x10info
vector(obs_l1) x10= @subextract(x10full,1,1,obs_l1,1)

series x11diff=nrnd
series x11info=(0.8^0.5)*common+(0.2^0.5)*x11diff
vector x11full=x11info
vector(obs_l1) x11= @subextract(x11full,1,1,obs_l1,1)

series x12diff=nrnd
series x12info=(0.8^0.5)*common+(0.2^0.5)*x12diff
vector x12full=x12info
vector(obs_l1) x12= @subextract(x12full,1,1,obs_l1,1)
```

```
series yerr=nrnd
vector yfull=1/9*x2info+1/9*x3info+1/9*x4info+1/9*x6info+1/9*x7info+1/9*x8info+1/9*x10info+1/9*x11info+1/9*x12info+yerr    'same level of information for each case
vector(obs_l1) y= @subextract(yfull,1,1,obs_l1,1)

matrix(obs_l1,12) x
matplace(x,x1,1,1)
matplace(x,x2,1,2)
matplace(x,x3,1,3)
matplace(x,x4,1,4)
matplace(x,x5,1,5)
matplace(x,x6,1,6)
matplace(x,x7,1,7)
matplace(x,x8,1,8)
```

matplace(x,x9,1,9)

matplace(x,x10,1,10)

matplace(x,x11,1,11)

matplace(x,x12,1,12)

'new betas

matrix(obs_l1,4) x_part1

matplace(x_part1,x1,1,1)

matplace(x_part1,x2,1,2)

matplace(x_part1,x3,1,3)

matplace(x_part1,x4,1,4)

matrix(obs_l1,4) x_part2

matplace(x_part2,x5,1,1)

matplace(x_part2,x6,1,2)

matplace(x_part2,x7,1,3)

matplace(x_part2,x8,1,4)

matrix(obs_l1,4) x_part3

matplace(x_part3,x9,1,1)

matplace(x_part3,x10,1,2)

matplace(x_part3,x11,1,3)

matplace(x_part3,x12,1,4)

vector bols_part1= @inverse(@transpose(x_part1)*x_part1)*@transpose(x_part1)*y

vector bols_part2= @inverse(@transpose(x_part2)*x_part2)*@transpose(x_part2)*y

vector bols_part3= @inverse(@transpose(x_part3)*x_part3)*@transpose(x_part3)*y

```
matrix x_beta_part1=x_part1*bols_part1
matrix x_beta_part2=x_part2*bols_part2
matrix x_beta_part3=x_part3*bols_part3

matrix(obs_l1,3) x_ave
matplace(x_ave,x_beta_part1,1,1)
matplace(x_ave,x_beta_part2,1,2)
matplace(x_ave,x_beta_part3,1,3)

vector bols_ave= @inverse(@transpose(x_ave)*x_ave)*@transpose(x_ave)*y      'unconstrained
vector cbols_ave= bols_ave-(@transpose(x_ave)*x_ave)*q*@inverse(@transpose(q)*(@transpose(x_ave)*x_ave)*q)*(@transpose(q)*bols_ave-one)    'constrained



vector(12) bnew
bnew(1)=cbols_ave(1)*bols_part1(1)
bnew(2)=cbols_ave(1)*bols_part1(2)
bnew(3)=cbols_ave(1)*bols_part1(3)
bnew(4)=cbols_ave(1)*bols_part1(4)
bnew(5)=cbols_ave(2)*bols_part2(1)
bnew(6)=cbols_ave(2)*bols_part2(2)
bnew(7)=cbols_ave(2)*bols_part2(3)
bnew(8)=cbols_ave(2)*bols_part2(4)
bnew(9)=cbols_ave(3)*bols_part3(1)
bnew(10)=cbols_ave(3)*bols_part3(2)
bnew(11)=cbols_ave(3)*bols_part3(3)
bnew(12)=cbols_ave(3)*bols_part3(4)
```

```
b1_new(!i)=bnew(1)

b2_new(!i)=bnew(2)


'compute insample residuals

vector new_resids=x*bnew-y

scalar new_sqresids=@transpose(new_resids)*new_resids


'compute out of sample errors

scalar errornew=yfull(obs)-
(x1full(obs)*bnew(1)+x2full(obs)*bnew(2)+x3full(obs)*bnew(3)+x4full(obs)*bnew(4)+x5full(obs)*bnew(5)+x6full(obs)*bnew(6)+x7full(obs)*bnew(7)+x8full(obs)*bnew(8)+x9full(obs)*bnew(9)+x10full(obs)*bnew(10)+x11full(obs)*bnew(11)+x
12full(obs)*bnew(12))


errors_new(!i)=errornew

errors_new_squared(!i)=errornew*errornew

errors_new_rootsquared(!i)=(errornew*errornew)^0.5

errors_new_squared_est1(!i)=new_sqresids/obs_l1+2*dof_est*1/obs_l1                    'Mallows Cp estimate using FC DoF

errors_new_squared_est2(!i)=new_sqresids/obs_l1+2*dof_naive*1/obs_l1                                                    'Mallows Cp estimate using simple parameter count


err_est1_diff(!i)=errors_new_squared(!i)-errors_new_squared_est1(!i)

err_est2_diff(!i)=errors_new_squared(!i)-errors_new_squared_est2(!i)



next


scalar ave_err_new_sq=@mean(errors_new_squared)
```

```
scalar ave_cp1=@mean(errors_new_squared_est1)
scalar ave_cp2=@mean(errors_new_squared_est2)
scalar ave_ratio_cp1=ave_cp1/ave_err_new_sq
scalar ave_ratio_cp2=ave_cp2/ave_err_new_sq



wfsave(2) c:\data\sim\sim4\var3_obs{%v}


next





''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''' 5x5 models




for %v 25 50 100 200 1000
'Step one create an unstructured workfile with the desired number of observations you want to use.


wfselect var5_obs{%v}


scalar obs={%v}		'insert number of observations
scalar obs_l1=obs-1



vector(100000) errors_new
vector(100000) errors_new_squared
vector(100000) errors_new_rootsquared
```

vector(100000) errors_new_squared_est1

vector(100000) errors_new_squared_est2

vector(100000) err_est1_diff

vector(100000) err_est2_diff

vector(100000) b1_new

vector(100000) b2_new

vector(100000) b3_new

vector(100000) b4_new

vector(100000) b5_new

vector(5) q=1   'constraint for weighting scheme OLS

scalar one=1   'constraint for weighting scheme OLS

scalar num_aux=5   'number of auxiliary models

scalar aux_parm=6   'parameters in auxiliary models

scalar weight_parm=4   ' parameters in weighting scheme

scalar dof_est=1*aux_parm+weight_parm   'effective degrees of freedom as proposed by paper

scalar dof_naive=num_aux*aux_parm+weight_parm   'naive degrees of freedom counting parameters

for !i=1 to 100000

'Create data

series common=nrnd

```
series x1info=1                                    'constant
vector x1full=x1info
vector(obs_l1) x1= @subextract(x1full,1,1,obs_l1,1)

series x2diff=nrnd
series x2info=(0.8^0.5)*common+(0.2^0.5)*x2diff
vector x2full=x2info
vector(obs_l1) x2= @subextract(x2full,1,1,obs_l1,1)

series x3diff=nrnd
series x3info=(0.8^0.5)*common+(0.2^0.5)*x3diff
vector x3full=x3info
vector(obs_l1) x3= @subextract(x3full,1,1,obs_l1,1)

series x4diff=nrnd
series x4info=(0.8^0.5)*common+(0.2^0.5)*x4diff
vector x4full=x4info
vector(obs_l1) x4= @subextract(x4full,1,1,obs_l1,1)

series x5diff=nrnd
series x5info=(0.8^0.5)*common+(0.2^0.5)*x5diff
vector x5full=x5info
vector(obs_l1) x5= @subextract(x5full,1,1,obs_l1,1)

series x6diff=nrnd
series x6info=(0.8^0.5)*common+(0.2^0.5)*x6diff
vector x6full=x6info
vector(obs_l1) x6= @subextract(x6full,1,1,obs_l1,1)
```

```
series x7info=1                                    'constant
vector x7full=x7info
vector(obs_l1) x7= @subextract(x7full,1,1,obs_l1,1)

series x8diff=nrnd
series x8info=(0.8^0.5)*common+(0.2^0.5)*x8diff
vector x8full=x8info
vector(obs_l1) x8= @subextract(x8full,1,1,obs_l1,1)

series x9diff=nrnd
series x9info=(0.8^0.5)*common+(0.2^0.5)*x9diff
vector x9full=x9info
vector(obs_l1) x9= @subextract(x9full,1,1,obs_l1,1)

series x10diff=nrnd
series x10info=(0.8^0.5)*common+(0.2^0.5)*x10diff
vector x10full=x10info
vector(obs_l1) x10= @subextract(x10full,1,1,obs_l1,1)

series x11diff=nrnd
series x11info=(0.8^0.5)*common+(0.2^0.5)*x11diff
vector x11full=x11info
vector(obs_l1) x11= @subextract(x11full,1,1,obs_l1,1)

series x12diff=nrnd
series x12info=(0.8^0.5)*common+(0.2^0.5)*x12diff
vector x12full=x12info
```

```
vector(obs_l1) x12= @subextract(x12full,1,1,obs_l1,1)



series x13info=1                                                    'constant
vector x13full=x13info
vector(obs_l1) x13= @subextract(x13full,1,1,obs_l1,1)

series x14diff=nrnd
series x14info=(0.8^0.5)*common+(0.2^0.5)*x14diff
vector x14full=x14info
vector(obs_l1) x14= @subextract(x14full,1,1,obs_l1,1)

series x15diff=nrnd
series x15info=(0.8^0.5)*common+(0.2^0.5)*x15diff
vector x15full=x15info
vector(obs_l1) x15= @subextract(x15full,1,1,obs_l1,1)

series x16diff=nrnd
series x16info=(0.8^0.5)*common+(0.2^0.5)*x16diff
vector x16full=x16info
vector(obs_l1) x16= @subextract(x16full,1,1,obs_l1,1)

series x17diff=nrnd
series x17info=(0.8^0.5)*common+(0.2^0.5)*x17diff
vector x17full=x17info
vector(obs_l1) x17= @subextract(x17full,1,1,obs_l1,1)

series x18diff=nrnd
```

```
series x18info=(0.8^0.5)*common+(0.2^0.5)*x18diff
vector x18full=x18info
vector(obs_l1) x18= @subextract(x18full,1,1,obs_l1,1)


series x19info=1                                        'constant
vector x19full=x19info
vector(obs_l1) x19= @subextract(x19full,1,1,obs_l1,1)

series x20diff=nrnd
series x20info=(0.8^0.5)*common+(0.2^0.5)*x20diff
vector x20full=x20info
vector(obs_l1) x20= @subextract(x20full,1,1,obs_l1,1)

series x21diff=nrnd
series x21info=(0.8^0.5)*common+(0.2^0.5)*x21diff
vector x21full=x21info
vector(obs_l1) x21= @subextract(x21full,1,1,obs_l1,1)

series x22diff=nrnd
series x22info=(0.8^0.5)*common+(0.2^0.5)*x22diff
vector x22full=x22info
vector(obs_l1) x22= @subextract(x22full,1,1,obs_l1,1)

series x23diff=nrnd
series x23info=(0.8^0.5)*common+(0.2^0.5)*x23diff
vector x23full=x23info
vector(obs_l1) x23= @subextract(x23full,1,1,obs_l1,1)
```

```
series x24diff=nrnd
series x24info=(0.8^0.5)*common+(0.2^0.5)*x24diff
vector x24full=x24info
vector(obs_l1) x24= @subextract(x24full,1,1,obs_l1,1)


series x25info=1                                        'constant
vector x25full=x25info
vector(obs_l1) x25= @subextract(x25full,1,1,obs_l1,1)

series x26diff=nrnd
series x26info=(0.8^0.5)*common+(0.2^0.5)*x26diff
vector x26full=x26info
vector(obs_l1) x26= @subextract(x26full,1,1,obs_l1,1)

series x27diff=nrnd
series x27info=(0.8^0.5)*common+(0.2^0.5)*x27diff
vector x27full=x27info
vector(obs_l1) x27= @subextract(x27full,1,1,obs_l1,1)

series x28diff=nrnd
series x28info=(0.8^0.5)*common+(0.2^0.5)*x28diff
vector x28full=x28info
vector(obs_l1) x28= @subextract(x28full,1,1,obs_l1,1)

series x29diff=nrnd
series x29info=(0.8^0.5)*common+(0.2^0.5)*x29diff
vector x29full=x29info
vector(obs_l1) x29= @subextract(x29full,1,1,obs_l1,1)
```

```
series x30diff=nrnd

series x30info=(0.8^0.5)*common+(0.2^0.5)*x30diff

vector x30full=x30info

vector(obs_l1) x30= @subextract(x30full,1,1,obs_l1,1)




series yerr=nrnd

vector
yfull=1/25*x2info+1/25*x3info+1/25*x4info+1/25*x5info+1/25*x6info+1/25*x8info+1/25*x9info+1/25*x10info+1/25*x11info+1/25*x12info+1/25*x14info+1/25*x15info+1/25*x16info+1/25*x17info+1/25*x18info+1/25*x20info+1/25*x21inf
o+1/25*x22info+1/25*x23info+1/25*x24info+1/25*x26info+1/25*x27info+1/25*x28info+1/25*x29info+1/25*x30info+yerr    'same level of information for each case

vector(obs_l1) y= @subextract(yfull,1,1,obs_l1,1)


matrix(obs_l1,30) x
matplace(x,x1,1,1)
matplace(x,x2,1,2)
matplace(x,x3,1,3)
matplace(x,x4,1,4)
matplace(x,x5,1,5)
matplace(x,x6,1,6)
matplace(x,x7,1,7)
matplace(x,x8,1,8)
matplace(x,x9,1,9)
matplace(x,x10,1,10)
matplace(x,x11,1,11)
matplace(x,x12,1,12)
matplace(x,x13,1,13)
matplace(x,x14,1,14)
```

matplace(x,x15,1,15)

matplace(x,x16,1,16)

matplace(x,x17,1,17)

matplace(x,x18,1,18)

matplace(x,x19,1,19)

matplace(x,x20,1,20)

matplace(x,x21,1,21)

matplace(x,x22,1,22)

matplace(x,x23,1,23)

matplace(x,x24,1,24)

matplace(x,x25,1,25)

matplace(x,x26,1,26)

matplace(x,x27,1,27)

matplace(x,x28,1,28)

matplace(x,x29,1,29)

matplace(x,x30,1,30)

'new betas

matrix(obs_l1,6) x_part1

matplace(x_part1,x1,1,1)

matplace(x_part1,x2,1,2)

matplace(x_part1,x3,1,3)

matplace(x_part1,x4,1,4)

matplace(x_part1,x5,1,5)

matplace(x_part1,x6,1,6)

```
matrix(obs_l1,6) x_part2
matplace(x_part2,x7,1,1)
matplace(x_part2,x8,1,2)
matplace(x_part2,x9,1,3)
matplace(x_part2,x10,1,4)
matplace(x_part2,x11,1,5)
matplace(x_part2,x12,1,6)

matrix(obs_l1,6) x_part3
matplace(x_part3,x13,1,1)
matplace(x_part3,x14,1,2)
matplace(x_part3,x15,1,3)
matplace(x_part3,x16,1,4)
matplace(x_part3,x17,1,5)
matplace(x_part3,x18,1,6)

matrix(obs_l1,6) x_part4
matplace(x_part4,x19,1,1)
matplace(x_part4,x20,1,2)
matplace(x_part4,x21,1,3)
matplace(x_part4,x22,1,4)
matplace(x_part4,x23,1,5)
matplace(x_part4,x24,1,6)

matrix(obs_l1,6) x_part5
matplace(x_part5,x25,1,1)
matplace(x_part5,x26,1,2)
matplace(x_part5,x27,1,3)
matplace(x_part5,x28,1,4)
```

```
matplace(x_part5,x29,1,5)
matplace(x_part5,x30,1,6)

vector bols_part1= @inverse(@transpose(x_part1)*x_part1)*@transpose(x_part1)*y
vector bols_part2= @inverse(@transpose(x_part2)*x_part2)*@transpose(x_part2)*y
vector bols_part3= @inverse(@transpose(x_part3)*x_part3)*@transpose(x_part3)*y
vector bols_part4= @inverse(@transpose(x_part4)*x_part4)*@transpose(x_part4)*y
vector bols_part5= @inverse(@transpose(x_part5)*x_part5)*@transpose(x_part5)*y

matrix x_beta_part1=x_part1*bols_part1
matrix x_beta_part2=x_part2*bols_part2
matrix x_beta_part3=x_part3*bols_part3
matrix x_beta_part4=x_part4*bols_part4
matrix x_beta_part5=x_part5*bols_part5

matrix(obs_l1,5) x_ave
matplace(x_ave,x_beta_part1,1,1)
matplace(x_ave,x_beta_part2,1,2)
matplace(x_ave,x_beta_part3,1,3)
matplace(x_ave,x_beta_part4,1,4)
matplace(x_ave,x_beta_part5,1,5)

vector bols_ave= @inverse(@transpose(x_ave)*x_ave)*@transpose(x_ave)*y      'unconstrained
vector cbols_ave= bols_ave-(@transpose(x_ave)*x_ave)*q*@inverse(@transpose(q)*(@transpose(x_ave)*x_ave)*q)*(@transpose(q)*bols_ave-one)    'constrained


vector(30) bnew
```

bnew(1)=cbols_ave(1)*bols_part1(1)

bnew(2)=cbols_ave(1)*bols_part1(2)

bnew(3)=cbols_ave(1)*bols_part1(3)

bnew(4)=cbols_ave(1)*bols_part1(4)

bnew(5)=cbols_ave(1)*bols_part1(5)

bnew(6)=cbols_ave(1)*bols_part1(6)

bnew(7)=cbols_ave(2)*bols_part2(1)

bnew(8)=cbols_ave(2)*bols_part2(2)

bnew(9)=cbols_ave(2)*bols_part2(3)

bnew(10)=cbols_ave(2)*bols_part2(4)

bnew(11)=cbols_ave(2)*bols_part2(5)

bnew(12)=cbols_ave(2)*bols_part2(6)

bnew(13)=cbols_ave(3)*bols_part3(1)

bnew(14)=cbols_ave(3)*bols_part3(2)

bnew(15)=cbols_ave(3)*bols_part3(3)

bnew(16)=cbols_ave(3)*bols_part3(4)

bnew(17)=cbols_ave(3)*bols_part3(5)

bnew(18)=cbols_ave(3)*bols_part3(6)

bnew(19)=cbols_ave(4)*bols_part4(1)

bnew(20)=cbols_ave(4)*bols_part4(2)

bnew(21)=cbols_ave(4)*bols_part4(3)

bnew(22)=cbols_ave(4)*bols_part4(4)

bnew(23)=cbols_ave(4)*bols_part4(5)

bnew(24)=cbols_ave(4)*bols_part4(6)

bnew(25)=cbols_ave(5)*bols_part5(1)

bnew(26)=cbols_ave(5)*bols_part5(2)

bnew(27)=cbols_ave(5)*bols_part5(3)

bnew(28)=cbols_ave(5)*bols_part5(4)

bnew(29)=cbols_ave(5)*bols_part5(5)

bnew(30)=cbols_ave(5)*bols_part5(6)

b1_new(!i)=bnew(1)

b2_new(!i)=bnew(2)

'compute insample residuals

vector new_resids=x*bnew-y

scalar new_sqresids=@transpose(new_resids)*new_resids

'compute out of sample errors

scalar errornew=yfull(obs)-
(x1full(obs)*bnew(1)+x2full(obs)*bnew(2)+x3full(obs)*bnew(3)+x4full(obs)*bnew(4)+x5full(obs)*bnew(5)+x6full(obs)*bnew(6)+x7full(obs)*bnew(7)+x8full(obs)*bnew(8)+x9full(obs)*bnew(9)+x10full(obs)*bnew(10)+x11full(obs)*bnew(11)+x12full(obs)*bnew(12)+x13full(obs)*bnew(13)+x14full(obs)*bnew(14)+x15full(obs)*bnew(15)+x16full(obs)*bnew(16)+x17full(obs)*bnew(17)+x18full(obs)*bnew(18)+x19full(obs)*bnew(19)+x20full(obs)*bnew(20)+x21full(obs)*bnew(21)+x22full(obs)*bnew(22)+x23full(obs)*bnew(23)+x24full(obs)*bnew(24)+x25full(obs)*bnew(25)+x26full(obs)*bnew(26)+x27full(obs)*bnew(27)+x28full(obs)*bnew(28)+x29full(obs)*bnew(29)+x30full(obs)*bnew(30))

errors_new(!i)=errornew

errors_new_squared(!i)=errornew*errornew

errors_new_rootsquared(!i)=(errornew*errornew)^0.5

errors_new_squared_est1(!i)=new_sqresids/obs_l1+2*dof_est*1/obs_l1 'Mallows Cp estimate using FC DoF

errors_new_squared_est2(!i)=new_sqresids/obs_l1+2*dof_naive*1/obs_l1 'Mallows Cp estimate using simple parameter count

err_est1_diff(!i)=errors_new_squared(!i)-errors_new_squared_est1(!i)

err_est2_diff(!i)=errors_new_squared(!i)-errors_new_squared_est2(!i)

next

```
scalar ave_err_new_sq=@mean(errors_new_squared)
scalar ave_cp1=@mean(errors_new_squared_est1)
scalar ave_cp2=@mean(errors_new_squared_est2)
scalar ave_ratio_cp1=ave_cp1/ave_err_new_sq
scalar ave_ratio_cp2=ave_cp2/ave_err_new_sq


wfsave(2) c:\data\sim\sim4\var5_obs{%v}

next


''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''' '''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''' '''''''''''''''''''''''''''''''''''' 10x10 models


for %v 25 50 100 200 1000
'Step one create an unstructured workfile with the desired number of observations you want to use.

wfselect var10_obs{%v}

scalar obs={%v}             'insert number of observations
scalar obs_l1=obs-1


vector(100000) errors_new
vector(100000) errors_new_squared
vector(100000) errors_new_rootsquared
vector(100000) errors_new_squared_est1
vector(100000) errors_new_squared_est2
```

vector(100000) err_est1_diff

vector(100000) err_est2_diff

vector(100000) b1_new

vector(100000) b2_new

vector(100000) b3_new

vector(100000) b4_new

vector(100000) b5_new

vector(100000) b6_new

vector(100000) b7_new

vector(100000) b8_new

vector(100000) b9_new

vector(100000) b10_new

vector(10) q=1   'constraint for weighting scheme OLS

scalar one=1   'constraint for weighting scheme OLS

scalar num_aux=10   'number of auxiliary models

scalar aux_parm=11   'parameters in auxiliary models

scalar weight_parm=9   ' parameters in weighting scheme

scalar dof_est=1*aux_parm+weight_parm   'effective degrees of freedom as proposed by paper

scalar dof_naive=num_aux*aux_parm+weight_parm   'naive degrees of freedom counting parameters

for !i=1 to 100000

'Create data

series common=nrnd

series x1info=1 'constant

vector x1full=x1info

vector(obs_l1) x1= @subextract(x1full,1,1,obs_l1,1)

series x2diff=nrnd

series x2info=(0.8^0.5)*common+(0.2^0.5)*x2diff

vector x2full=x2info

vector(obs_l1) x2= @subextract(x2full,1,1,obs_l1,1)

series x3diff=nrnd

series x3info=(0.8^0.5)*common+(0.2^0.5)*x3diff

vector x3full=x3info

vector(obs_l1) x3= @subextract(x3full,1,1,obs_l1,1)

series x4diff=nrnd

series x4info=(0.8^0.5)*common+(0.2^0.5)*x4diff

vector x4full=x4info

vector(obs_l1) x4= @subextract(x4full,1,1,obs_l1,1)

series x5diff=nrnd

series x5info=(0.8^0.5)*common+(0.2^0.5)*x5diff

vector x5full=x5info

vector(obs_l1) x5= @subextract(x5full,1,1,obs_l1,1)

```
series x6diff=nrnd
series x6info=(0.8^0.5)*common+(0.2^0.5)*x6diff
vector x6full=x6info
vector(obs_l1) x6= @subextract(x6full,1,1,obs_l1,1)

series x7diff=nrnd
series x7info=(0.8^0.5)*common+(0.2^0.5)*x7diff
vector x7full=x7info
vector(obs_l1) x7= @subextract(x7full,1,1,obs_l1,1)

series x8diff=nrnd
series x8info=(0.8^0.5)*common+(0.2^0.5)*x8diff
vector x8full=x8info
vector(obs_l1) x8= @subextract(x8full,1,1,obs_l1,1)

series x9diff=nrnd
series x9info=(0.8^0.5)*common+(0.2^0.5)*x9diff
vector x9full=x9info
vector(obs_l1) x9= @subextract(x9full,1,1,obs_l1,1)

series x10diff=nrnd
series x10info=(0.8^0.5)*common+(0.2^0.5)*x10diff
vector x10full=x10info
vector(obs_l1) x10= @subextract(x10full,1,1,obs_l1,1)

series x11diff=nrnd
series x11info=(0.8^0.5)*common+(0.2^0.5)*x11diff
vector x11full=x11info
vector(obs_l1) x11= @subextract(x11full,1,1,obs_l1,1)
```

```
series x12info=1                                        'constant
vector x12full=x12info
vector(obs_l1) x12= @subextract(x12full,1,1,obs_l1,1)

series x13diff=nrnd
series x13info=(0.8^0.5)*common+(0.2^0.5)*x13diff
vector x13full=x13info
vector(obs_l1) x13= @subextract(x13full,1,1,obs_l1,1)

series x14diff=nrnd
series x14info=(0.8^0.5)*common+(0.2^0.5)*x14diff
vector x14full=x14info
vector(obs_l1) x14= @subextract(x14full,1,1,obs_l1,1)

series x15diff=nrnd
series x15info=(0.8^0.5)*common+(0.2^0.5)*x15diff
vector x15full=x15info
vector(obs_l1) x15= @subextract(x15full,1,1,obs_l1,1)

series x16diff=nrnd
series x16info=(0.8^0.5)*common+(0.2^0.5)*x16diff
vector x16full=x16info
vector(obs_l1) x16= @subextract(x16full,1,1,obs_l1,1)

series x17diff=nrnd
series x17info=(0.8^0.5)*common+(0.2^0.5)*x17diff
vector x17full=x17info
```

```
vector(obs_l1) x17= @subextract(x17full,1,1,obs_l1,1)

series x18diff=nrnd
series x18info=(0.8^0.5)*common+(0.2^0.5)*x18diff
vector x18full=x18info
vector(obs_l1) x18= @subextract(x18full,1,1,obs_l1,1)

series x19diff=nrnd
series x19info=(0.8^0.5)*common+(0.2^0.5)*x19diff
vector x19full=x19info
vector(obs_l1) x19= @subextract(x19full,1,1,obs_l1,1)

series x20diff=nrnd
series x20info=(0.8^0.5)*common+(0.2^0.5)*x20diff
vector x20full=x20info
vector(obs_l1) x20= @subextract(x20full,1,1,obs_l1,1)

series x21diff=nrnd
series x21info=(0.8^0.5)*common+(0.2^0.5)*x21diff
vector x21full=x21info
vector(obs_l1) x21= @subextract(x21full,1,1,obs_l1,1)

series x22diff=nrnd
series x22info=(0.8^0.5)*common+(0.2^0.5)*x22diff
vector x22full=x22info
vector(obs_l1) x22= @subextract(x22full,1,1,obs_l1,1)


series x23info=1                                        'constant
```

```
vector x23full=x23info
vector(obs_l1) x23= @subextract(x23full,1,1,obs_l1,1)

series x24diff=nrnd
series x24info=(0.8^0.5)*common+(0.2^0.5)*x24diff
vector x24full=x24info
vector(obs_l1) x24= @subextract(x24full,1,1,obs_l1,1)

series x25diff=nrnd
series x25info=(0.8^0.5)*common+(0.2^0.5)*x25diff
vector x25full=x25info
vector(obs_l1) x25= @subextract(x25full,1,1,obs_l1,1)

series x26diff=nrnd
series x26info=(0.8^0.5)*common+(0.2^0.5)*x26diff
vector x26full=x26info
vector(obs_l1) x26= @subextract(x26full,1,1,obs_l1,1)

series x27diff=nrnd
series x27info=(0.8^0.5)*common+(0.2^0.5)*x27diff
vector x27full=x27info
vector(obs_l1) x27= @subextract(x27full,1,1,obs_l1,1)

series x28diff=nrnd
series x28info=(0.8^0.5)*common+(0.2^0.5)*x28diff
vector x28full=x28info
vector(obs_l1) x28= @subextract(x28full,1,1,obs_l1,1)

series x29diff=nrnd
```

series x29info=(0.8^0.5)*common+(0.2^0.5)*x29diff

vector x29full=x29info

vector(obs_l1) x29= @subextract(x29full,1,1,obs_l1,1)

series x30diff=nrnd

series x30info=(0.8^0.5)*common+(0.2^0.5)*x30diff

vector x30full=x30info

vector(obs_l1) x30= @subextract(x30full,1,1,obs_l1,1)

series x31diff=nrnd

series x31info=(0.8^0.5)*common+(0.2^0.5)*x31diff

vector x31full=x31info

vector(obs_l1) x31= @subextract(x31full,1,1,obs_l1,1)

series x32diff=nrnd

series x32info=(0.8^0.5)*common+(0.2^0.5)*x32diff

vector x32full=x32info

vector(obs_l1) x32= @subextract(x32full,1,1,obs_l1,1)

series x33diff=nrnd

series x33info=(0.8^0.5)*common+(0.2^0.5)*x33diff

vector x33full=x33info

vector(obs_l1) x33= @subextract(x33full,1,1,obs_l1,1)

series x34info=1 'constant

vector x34full=x34info

vector(obs_l1) x34= @subextract(x34full,1,1,obs_l1,1)

```
series x35diff=nrnd
series x35info=(0.8^0.5)*common+(0.2^0.5)*x35diff
vector x35full=x35info
vector(obs_l1) x35= @subextract(x35full,1,1,obs_l1,1)

series x36diff=nrnd
series x36info=(0.8^0.5)*common+(0.2^0.5)*x36diff
vector x36full=x36info
vector(obs_l1) x36= @subextract(x36full,1,1,obs_l1,1)

series x37diff=nrnd
series x37info=(0.8^0.5)*common+(0.2^0.5)*x37diff
vector x37full=x37info
vector(obs_l1) x37= @subextract(x37full,1,1,obs_l1,1)

series x38diff=nrnd
series x38info=(0.8^0.5)*common+(0.2^0.5)*x38diff
vector x38full=x38info
vector(obs_l1) x38= @subextract(x38full,1,1,obs_l1,1)

series x39diff=nrnd
series x39info=(0.8^0.5)*common+(0.2^0.5)*x39diff
vector x39full=x39info
vector(obs_l1) x39= @subextract(x39full,1,1,obs_l1,1)

series x40diff=nrnd
series x40info=(0.8^0.5)*common+(0.2^0.5)*x40diff
vector x40full=x40info
```

```
vector(obs_l1) x40= @subextract(x40full,1,1,obs_l1,1)

series x41diff=nrnd
series x41info=(0.8^0.5)*common+(0.2^0.5)*x41diff
vector x41full=x41info
vector(obs_l1) x41= @subextract(x41full,1,1,obs_l1,1)

series x42diff=nrnd
series x42info=(0.8^0.5)*common+(0.2^0.5)*x42diff
vector x42full=x42info
vector(obs_l1) x42= @subextract(x42full,1,1,obs_l1,1)

series x43diff=nrnd
series x43info=(0.8^0.5)*common+(0.2^0.5)*x43diff
vector x43full=x43info
vector(obs_l1) x43= @subextract(x43full,1,1,obs_l1,1)

series x44diff=nrnd
series x44info=(0.8^0.5)*common+(0.2^0.5)*x44diff
vector x44full=x44info
vector(obs_l1) x44= @subextract(x44full,1,1,obs_l1,1)


series x45info=1                                        'constant
vector x45full=x45info
vector(obs_l1) x45= @subextract(x45full,1,1,obs_l1,1)

series x46diff=nrnd
series x46info=(0.8^0.5)*common+(0.2^0.5)*x46diff
```

```
vector x46full=x46info
vector(obs_l1) x46= @subextract(x46full,1,1,obs_l1,1)

series x47diff=nrnd
series x47info=(0.8^0.5)*common+(0.2^0.5)*x47diff
vector x47full=x47info
vector(obs_l1) x47= @subextract(x47full,1,1,obs_l1,1)

series x48diff=nrnd
series x48info=(0.8^0.5)*common+(0.2^0.5)*x48diff
vector x48full=x48info
vector(obs_l1) x48= @subextract(x48full,1,1,obs_l1,1)

series x49diff=nrnd
series x49info=(0.8^0.5)*common+(0.2^0.5)*x49diff
vector x49full=x49info
vector(obs_l1) x49= @subextract(x49full,1,1,obs_l1,1)

series x50diff=nrnd
series x50info=(0.8^0.5)*common+(0.2^0.5)*x50diff
vector x50full=x50info
vector(obs_l1) x50= @subextract(x50full,1,1,obs_l1,1)

series x51diff=nrnd
series x51info=(0.8^0.5)*common+(0.2^0.5)*x51diff
vector x51full=x51info
vector(obs_l1) x51= @subextract(x51full,1,1,obs_l1,1)

series x52diff=nrnd
```

```
series x52info=(0.8^0.5)*common+(0.2^0.5)*x52diff
vector x52full=x52info
vector(obs_l1) x52= @subextract(x52full,1,1,obs_l1,1)

series x53diff=nrnd
series x53info=(0.8^0.5)*common+(0.2^0.5)*x53diff
vector x53full=x53info
vector(obs_l1) x53= @subextract(x53full,1,1,obs_l1,1)

series x54diff=nrnd
series x54info=(0.8^0.5)*common+(0.2^0.5)*x54diff
vector x54full=x54info
vector(obs_l1) x54= @subextract(x54full,1,1,obs_l1,1)

series x55diff=nrnd
series x55info=(0.8^0.5)*common+(0.2^0.5)*x55diff
vector x55full=x55info
vector(obs_l1) x55= @subextract(x55full,1,1,obs_l1,1)


series x56info=1                                        'constant
vector x56full=x56info
vector(obs_l1) x56= @subextract(x56full,1,1,obs_l1,1)

series x57diff=nrnd
series x57info=(0.8^0.5)*common+(0.2^0.5)*x57diff
vector x57full=x57info
vector(obs_l1) x57= @subextract(x57full,1,1,obs_l1,1)
```

```
series x58diff=nrnd
series x58info=(0.8^0.5)*common+(0.2^0.5)*x58diff
vector x58full=x58info
vector(obs_l1) x58= @subextract(x58full,1,1,obs_l1,1)

series x59diff=nrnd
series x59info=(0.8^0.5)*common+(0.2^0.5)*x59diff
vector x59full=x59info
vector(obs_l1) x59= @subextract(x59full,1,1,obs_l1,1)

series x60diff=nrnd
series x60info=(0.8^0.5)*common+(0.2^0.5)*x60diff
vector x60full=x60info
vector(obs_l1) x60= @subextract(x60full,1,1,obs_l1,1)

series x61diff=nrnd
series x61info=(0.8^0.5)*common+(0.2^0.5)*x61diff
vector x61full=x61info
vector(obs_l1) x61= @subextract(x61full,1,1,obs_l1,1)

series x62diff=nrnd
series x62info=(0.8^0.5)*common+(0.2^0.5)*x62diff
vector x62full=x62info
vector(obs_l1) x62= @subextract(x62full,1,1,obs_l1,1)

series x63diff=nrnd
series x63info=(0.8^0.5)*common+(0.2^0.5)*x63diff
vector x63full=x63info
vector(obs_l1) x63= @subextract(x63full,1,1,obs_l1,1)
```

```
series x64diff=nrnd
series x64info=(0.8^0.5)*common+(0.2^0.5)*x64diff
vector x64full=x64info
vector(obs_l1) x64= @subextract(x64full,1,1,obs_l1,1)

series x65diff=nrnd
series x65info=(0.8^0.5)*common+(0.2^0.5)*x65diff
vector x65full=x65info
vector(obs_l1) x65= @subextract(x65full,1,1,obs_l1,1)

series x66diff=nrnd
series x66info=(0.8^0.5)*common+(0.2^0.5)*x66diff
vector x66full=x66info
vector(obs_l1) x66= @subextract(x66full,1,1,obs_l1,1)
```

```
series x67info=1                                        'constant
vector x67full=x67info
vector(obs_l1) x67= @subextract(x67full,1,1,obs_l1,1)

series x68diff=nrnd
series x68info=(0.8^0.5)*common+(0.2^0.5)*x68diff
vector x68full=x68info
vector(obs_l1) x68= @subextract(x68full,1,1,obs_l1,1)

series x69diff=nrnd
series x69info=(0.8^0.5)*common+(0.2^0.5)*x69diff
vector x69full=x69info
```

vector(obs_l1) x69= @subextract(x69full,1,1,obs_l1,1)

series x70diff=nrnd

series x70info=(0.8^0.5)*common+(0.2^0.5)*x70diff

vector x70full=x70info

vector(obs_l1) x70= @subextract(x70full,1,1,obs_l1,1)

series x71diff=nrnd

series x71info=(0.8^0.5)*common+(0.2^0.5)*x71diff

vector x71full=x71info

vector(obs_l1) x71= @subextract(x71full,1,1,obs_l1,1)

series x72diff=nrnd

series x72info=(0.8^0.5)*common+(0.2^0.5)*x72diff

vector x72full=x72info

vector(obs_l1) x72= @subextract(x72full,1,1,obs_l1,1)

series x73diff=nrnd

series x73info=(0.8^0.5)*common+(0.2^0.5)*x73diff

vector x73full=x73info

vector(obs_l1) x73= @subextract(x73full,1,1,obs_l1,1)

series x74diff=nrnd

series x74info=(0.8^0.5)*common+(0.2^0.5)*x74diff

vector x74full=x74info

vector(obs_l1) x74= @subextract(x74full,1,1,obs_l1,1)

series x75diff=nrnd

series x75info=(0.8^0.5)*common+(0.2^0.5)*x75diff

vector x75full=x75info

vector(obs_l1) x75= @subextract(x75full,1,1,obs_l1,1)

series x76diff=nrnd

series x76info=(0.8^0.5)*common+(0.2^0.5)*x76diff

vector x76full=x76info

vector(obs_l1) x76= @subextract(x76full,1,1,obs_l1,1)

series x77diff=nrnd

series x77info=(0.8^0.5)*common+(0.2^0.5)*x77diff

vector x77full=x77info

vector(obs_l1) x77= @subextract(x77full,1,1,obs_l1,1)

series x78info=1 'constant

vector x78full=x78info

vector(obs_l1) x78= @subextract(x78full,1,1,obs_l1,1)

series x79diff=nrnd

series x79info=(0.8^0.5)*common+(0.2^0.5)*x79diff

vector x79full=x79info

vector(obs_l1) x79= @subextract(x79full,1,1,obs_l1,1)

series x80diff=nrnd

series x80info=(0.8^0.5)*common+(0.2^0.5)*x80diff

vector x80full=x80info

vector(obs_l1) x80= @subextract(x80full,1,1,obs_l1,1)

series x81diff=nrnd

```
series x81info=(0.8^0.5)*common+(0.2^0.5)*x81diff
vector x81full=x81info
vector(obs_l1) x81= @subextract(x81full,1,1,obs_l1,1)

series x82diff=nrnd
series x82info=(0.8^0.5)*common+(0.2^0.5)*x82diff
vector x82full=x82info
vector(obs_l1) x82= @subextract(x82full,1,1,obs_l1,1)

series x83diff=nrnd
series x83info=(0.8^0.5)*common+(0.2^0.5)*x83diff
vector x83full=x83info
vector(obs_l1) x83= @subextract(x83full,1,1,obs_l1,1)

series x84diff=nrnd
series x84info=(0.8^0.5)*common+(0.2^0.5)*x84diff
vector x84full=x84info
vector(obs_l1) x84= @subextract(x84full,1,1,obs_l1,1)

series x85diff=nrnd
series x85info=(0.8^0.5)*common+(0.2^0.5)*x85diff
vector x85full=x85info
vector(obs_l1) x85= @subextract(x85full,1,1,obs_l1,1)

series x86diff=nrnd
series x86info=(0.8^0.5)*common+(0.2^0.5)*x86diff
vector x86full=x86info
vector(obs_l1) x86= @subextract(x86full,1,1,obs_l1,1)
```

```
series x87diff=nrnd
series x87info=(0.8^0.5)*common+(0.2^0.5)*x87diff
vector x87full=x87info
vector(obs_l1) x87= @subextract(x87full,1,1,obs_l1,1)

series x88diff=nrnd
series x88info=(0.8^0.5)*common+(0.2^0.5)*x88diff
vector x88full=x88info
vector(obs_l1) x88= @subextract(x88full,1,1,obs_l1,1)


series x89info=1                                                    'constant
vector x89full=x89info
vector(obs_l1) x89= @subextract(x89full,1,1,obs_l1,1)

series x90diff=nrnd
series x90info=(0.8^0.5)*common+(0.2^0.5)*x90diff
vector x90full=x90info
vector(obs_l1) x90= @subextract(x90full,1,1,obs_l1,1)

series x91diff=nrnd
series x91info=(0.8^0.5)*common+(0.2^0.5)*x91diff
vector x91full=x91info
vector(obs_l1) x91= @subextract(x91full,1,1,obs_l1,1)

series x92diff=nrnd
series x92info=(0.8^0.5)*common+(0.2^0.5)*x92diff
vector x92full=x92info
vector(obs_l1) x92= @subextract(x92full,1,1,obs_l1,1)
```

```
series x93diff=nrnd
series x93info=(0.8^0.5)*common+(0.2^0.5)*x93diff
vector x93full=x93info
vector(obs_l1) x93= @subextract(x93full,1,1,obs_l1,1)

series x94diff=nrnd
series x94info=(0.8^0.5)*common+(0.2^0.5)*x94diff
vector x94full=x94info
vector(obs_l1) x94= @subextract(x94full,1,1,obs_l1,1)

series x95diff=nrnd
series x95info=(0.8^0.5)*common+(0.2^0.5)*x95diff
vector x95full=x95info
vector(obs_l1) x95= @subextract(x95full,1,1,obs_l1,1)

series x96diff=nrnd
series x96info=(0.8^0.5)*common+(0.2^0.5)*x96diff
vector x96full=x96info
vector(obs_l1) x96= @subextract(x96full,1,1,obs_l1,1)

series x97diff=nrnd
series x97info=(0.8^0.5)*common+(0.2^0.5)*x97diff
vector x97full=x97info
vector(obs_l1) x97= @subextract(x97full,1,1,obs_l1,1)

series x98diff=nrnd
series x98info=(0.8^0.5)*common+(0.2^0.5)*x98diff
vector x98full=x98info
```

vector(obs_l1) x98= @subextract(x98full,1,1,obs_l1,1)

series x99diff=nrnd

series x99info=(0.8^0.5)*common+(0.2^0.5)*x99diff

vector x99full=x99info

vector(obs_l1) x99= @subextract(x99full,1,1,obs_l1,1)

series x100info=1 'constant

vector x100full=x100info

vector(obs_l1) x100= @subextract(x100full,1,1,obs_l1,1)

series x101diff=nrnd

series x101info=(0.8^0.5)*common+(0.2^0.5)*x101diff

vector x101full=x101info

vector(obs_l1) x101= @subextract(x101full,1,1,obs_l1,1)

series x102diff=nrnd

series x102info=(0.8^0.5)*common+(0.2^0.5)*x102diff

vector x102full=x102info

vector(obs_l1) x102= @subextract(x102full,1,1,obs_l1,1)

series x103diff=nrnd

series x103info=(0.8^0.5)*common+(0.2^0.5)*x103diff

vector x103full=x103info

vector(obs_l1) x103= @subextract(x103full,1,1,obs_l1,1)

series x104diff=nrnd

series x104info=(0.8^0.5)*common+(0.2^0.5)*x104diff

```
vector x104full=x104info
vector(obs_l1) x104= @subextract(x104full,1,1,obs_l1,1)

series x105diff=nrnd
series x105info=(0.8^0.5)*common+(0.2^0.5)*x105diff
vector x105full=x105info
vector(obs_l1) x105= @subextract(x105full,1,1,obs_l1,1)

series x106diff=nrnd
series x106info=(0.8^0.5)*common+(0.2^0.5)*x106diff
vector x106full=x106info
vector(obs_l1) x106= @subextract(x106full,1,1,obs_l1,1)

series x107diff=nrnd
series x107info=(0.8^0.5)*common+(0.2^0.5)*x107diff
vector x107full=x107info
vector(obs_l1) x107= @subextract(x107full,1,1,obs_l1,1)

series x108diff=nrnd
series x108info=(0.8^0.5)*common+(0.2^0.5)*x108diff
vector x108full=x108info
vector(obs_l1) x108= @subextract(x108full,1,1,obs_l1,1)

series x109diff=nrnd
series x109info=(0.8^0.5)*common+(0.2^0.5)*x109diff
vector x109full=x109info
vector(obs_l1) x109= @subextract(x109full,1,1,obs_l1,1)

series x110diff=nrnd
```

series x110info=(0.8^0.5)*common+(0.2^0.5)*x110diff

vector x110full=x110info

vector(obs_l1) x110= @subextract(x110full,1,1,obs_l1,1)

series yerr=nrnd

vector yfull=1/100*x2info+1/100*x3info+1/100*x4info+1/100*x5info+1/100*x6info+1/100*x7info+1/100*x8info+1/100*x9info+1/100*x10info+1/100*x11info+1/100*x13info+1/100*x14info+1/100*x15info+1/100*x16info+1/100*x17info+1/100*x18info+1/100*x19info+1/100*x20info+1/100*x21info+1/100*x22info+1/100*x24info+1/100*x25info+1/100*x26info+1/100*x27info+1/100*x28info+1/100*x29info+1/100*x30info+1/100*x31info+1/100*x32info+1/100*x33info+1/100*x35info+1/100*x36info+1/100*x37info+1/100*x38info+1/100*x39info+1/100*x40info+1/100*x41info+1/100*x42info+1/100*x43info+1/100*x44info+1/100*x46info+1/100*x47info+1/100*x48info+1/100*x49info+1/100*x50info+1/100*x51info+1/100*x52info+1/100*x53info+1/100*x54info+1/100*x55info+1/100*x57info+1/100*x58info+1/100*x59info+1/100*x60info+1/100*x61info+1/100*x62info+1/100*x63info+1/100*x64info+1/100*x65info+1/100*x66info+1/100*x68info+1/100*x69info+1/100*x70info+1/100*x71info+1/100*x72info+1/100*x73info+1/100*x74info+1/100*x75info+1/100*x76info+1/100*x77info+1/100*x79info+1/100*x80info+1/100*x81info+1/100*x82info+1/100*x83info+1/100*x84info+1/100*x85info+1/100*x86info+1/100*x87info+1/100*x88info+1/100*x90info+1/100*x91info+1/100*x92info+1/100*x93info+1/100*x94info+1/100*x95info+1/100*x96info+1/100*x97info+1/100*x98info+1/100*x99info+1/100*x101info+1/100*x102info+1/100*x103info+1/100*x104info+1/100*x105info+1/100*x106info+1/100*x107info+1/100*x108info+1/100*x109info+1/100*x110info+yerr 'same level of information for each case

vector(obs_l1) y= @subextract(yfull,1,1,obs_l1,1)

matrix(obs_l1,110) x

matplace(x,x1,1,1)

matplace(x,x2,1,2)

matplace(x,x3,1,3)

matplace(x,x4,1,4)

matplace(x,x5,1,5)

matplace(x,x6,1,6)

matplace(x,x7,1,7)

matplace(x,x8,1,8)

matplace(x,x9,1,9)

matplace(x,x10,1,10)

matplace(x,x11,1,11)

matplace(x,x12,1,12)

matplace(x,x13,1,13)

matplace(x,x14,1,14)

matplace(x,x15,1,15)

matplace(x,x16,1,16)

matplace(x,x17,1,17)

matplace(x,x18,1,18)

matplace(x,x19,1,19)

matplace(x,x20,1,20)

matplace(x,x21,1,21)

matplace(x,x22,1,22)

matplace(x,x23,1,23)

matplace(x,x24,1,24)

matplace(x,x25,1,25)

matplace(x,x26,1,26)

matplace(x,x27,1,27)

matplace(x,x28,1,28)

matplace(x,x29,1,29)

matplace(x,x30,1,30)

matplace(x,x31,1,31)

matplace(x,x32,1,32)

matplace(x,x33,1,33)

matplace(x,x34,1,34)

matplace(x,x35,1,35)

matplace(x,x36,1,36)

matplace(x,x37,1,37)

matplace(x,x38,1,38)

matplace(x,x39,1,39)

matplace(x,x40,1,40)

matplace(x,x41,1,41)

matplace(x,x42,1,42)

matplace(x,x43,1,43)

matplace(x,x44,1,44)

matplace(x,x45,1,45)

matplace(x,x46,1,46)

matplace(x,x47,1,47)

matplace(x,x48,1,48)

matplace(x,x49,1,49)

matplace(x,x50,1,50)

matplace(x,x51,1,51)

matplace(x,x52,1,52)

matplace(x,x53,1,53)

matplace(x,x54,1,54)

matplace(x,x55,1,55)

matplace(x,x56,1,56)

matplace(x,x57,1,57)

matplace(x,x58,1,58)

matplace(x,x59,1,59)

matplace(x,x60,1,60)

matplace(x,x61,1,61)

matplace(x,x62,1,62)

matplace(x,x63,1,63)

matplace(x,x64,1,64)

matplace(x,x65,1,65)

matplace(x,x66,1,66)

matplace(x,x67,1,67)

matplace(x,x68,1,68)

matplace(x,x69,1,69)

matplace(x,x70,1,70)

matplace(x,x71,1,71)

matplace(x,x72,1,72)

matplace(x,x73,1,73)

matplace(x,x74,1,74)

matplace(x,x75,1,75)

matplace(x,x76,1,76)

matplace(x,x77,1,77)

matplace(x,x78,1,78)

matplace(x,x79,1,79)

matplace(x,x80,1,80)

matplace(x,x81,1,81)

matplace(x,x82,1,82)

matplace(x,x83,1,83)

matplace(x,x84,1,84)

matplace(x,x85,1,85)

matplace(x,x86,1,86)

matplace(x,x87,1,87)

matplace(x,x88,1,88)

matplace(x,x89,1,89)

matplace(x,x90,1,90)

matplace(x,x91,1,91)

matplace(x,x92,1,92)

matplace(x,x93,1,93)

matplace(x,x94,1,94)

matplace(x,x95,1,95)

matplace(x,x96,1,96)

matplace(x,x97,1,97)

matplace(x,x98,1,98)

matplace(x,x99,1,99)

matplace(x,x100,1,100)

matplace(x,x101,1,101)

matplace(x,x102,1,102)

matplace(x,x103,1,103)

matplace(x,x104,1,104)

matplace(x,x105,1,105)

matplace(x,x106,1,106)

matplace(x,x107,1,107)

matplace(x,x108,1,108)

matplace(x,x109,1,109)

matplace(x,x110,1,110)

'new betas

matrix(obs_l1,11) x_part1

matplace(x_part1,x1,1,1)

matplace(x_part1,x2,1,2)

matplace(x_part1,x3,1,3)

matplace(x_part1,x4,1,4)

matplace(x_part1,x5,1,5)

matplace(x_part1,x6,1,6)

matplace(x_part1,x7,1,7)

matplace(x_part1,x8,1,8)

matplace(x_part1,x9,1,9)

matplace(x_part1,x10,1,10)

matplace(x_part1,x11,1,11)

matrix(obs_l1,11) x_part2

matplace(x_part2,x12,1,1)

matplace(x_part2,x13,1,2)

matplace(x_part2,x14,1,3)

matplace(x_part2,x15,1,4)

matplace(x_part2,x16,1,5)

matplace(x_part2,x17,1,6)

matplace(x_part2,x18,1,7)

matplace(x_part2,x19,1,8)

matplace(x_part2,x20,1,9)

matplace(x_part2,x21,1,10)

matplace(x_part2,x22,1,11)

matrix(obs_l1,11) x_part3

matplace(x_part3,x23,1,1)

matplace(x_part3,x24,1,2)

matplace(x_part3,x25,1,3)

matplace(x_part3,x26,1,4)

matplace(x_part3,x27,1,5)

matplace(x_part3,x28,1,6)

matplace(x_part3,x29,1,7)

matplace(x_part3,x30,1,8)

matplace(x_part3,x31,1,9)

matplace(x_part3,x32,1,10)

matplace(x_part3,x33,1,11)

matrix(obs_l1,11) x_part4

matplace(x_part4,x34,1,1)

matplace(x_part4,x35,1,2)

matplace(x_part4,x36,1,3)

matplace(x_part4,x37,1,4)

matplace(x_part4,x38,1,5)

matplace(x_part4,x39,1,6)

matplace(x_part4,x40,1,7)

matplace(x_part4,x41,1,8)

matplace(x_part4,x42,1,9)

matplace(x_part4,x43,1,10)

matplace(x_part4,x44,1,11)

matrix(obs_l1,11) x_part5

matplace(x_part5,x45,1,1)

matplace(x_part5,x46,1,2)

matplace(x_part5,x47,1,3)

matplace(x_part5,x48,1,4)

matplace(x_part5,x49,1,5)

matplace(x_part5,x50,1,6)

matplace(x_part5,x51,1,7)

matplace(x_part5,x52,1,8)

matplace(x_part5,x53,1,9)

matplace(x_part5,x54,1,10)

matplace(x_part5,x55,1,11)

matrix(obs_l1,11) x_part6

matplace(x_part6,x56,1,1)

matplace(x_part6,x57,1,2)

matplace(x_part6,x58,1,3)

matplace(x_part6,x59,1,4)

matplace(x_part6,x60,1,5)

matplace(x_part6,x61,1,6)

matplace(x_part6,x62,1,7)

matplace(x_part6,x63,1,8)

matplace(x_part6,x64,1,9)

matplace(x_part6,x65,1,10)

matplace(x_part6,x66,1,11)

matrix(obs_l1,11) x_part7

matplace(x_part7,x67,1,1)

matplace(x_part7,x68,1,2)

matplace(x_part7,x69,1,3)

matplace(x_part7,x70,1,4)

matplace(x_part7,x71,1,5)

matplace(x_part7,x72,1,6)

matplace(x_part7,x73,1,7)

matplace(x_part7,x74,1,8)

matplace(x_part7,x75,1,9)

matplace(x_part7,x76,1,10)

matplace(x_part7,x77,1,11)

matrix(obs_l1,11) x_part8

matplace(x_part8,x78,1,1)

matplace(x_part8,x79,1,2)

matplace(x_part8,x80,1,3)

matplace(x_part8,x81,1,4)

matplace(x_part8,x82,1,5)

matplace(x_part8,x83,1,6)

matplace(x_part8,x84,1,7)

matplace(x_part8,x85,1,8)

matplace(x_part8,x86,1,9)

matplace(x_part8,x87,1,10)

matplace(x_part8,x88,1,11)

matrix(obs_l1,11) x_part9

matplace(x_part9,x89,1,1)

matplace(x_part9,x90,1,2)

matplace(x_part9,x91,1,3)

matplace(x_part9,x92,1,4)

matplace(x_part9,x93,1,5)

matplace(x_part9,x94,1,6)

matplace(x_part9,x95,1,7)

matplace(x_part9,x96,1,8)

matplace(x_part9,x97,1,9)

matplace(x_part9,x98,1,10)

matplace(x_part9,x99,1,11)

matrix(obs_l1,11) x_part10

matplace(x_part10,x100,1,1)

matplace(x_part10,x101,1,2)

matplace(x_part10,x102,1,3)

matplace(x_part10,x103,1,4)

matplace(x_part10,x104,1,5)

matplace(x_part10,x105,1,6)

matplace(x_part10,x106,1,7)

matplace(x_part10,x107,1,8)

matplace(x_part10,x108,1,9)

matplace(x_part10,x109,1,10)

```
matplace(x_part10,x110,1,11)

vector bols_part1= @inverse(@transpose(x_part1)*x_part1)*@transpose(x_part1)*y
vector bols_part2= @inverse(@transpose(x_part2)*x_part2)*@transpose(x_part2)*y
vector bols_part3= @inverse(@transpose(x_part3)*x_part3)*@transpose(x_part3)*y
vector bols_part4= @inverse(@transpose(x_part4)*x_part4)*@transpose(x_part4)*y
vector bols_part5= @inverse(@transpose(x_part5)*x_part5)*@transpose(x_part5)*y
vector bols_part6= @inverse(@transpose(x_part6)*x_part6)*@transpose(x_part6)*y
vector bols_part7= @inverse(@transpose(x_part7)*x_part7)*@transpose(x_part7)*y
vector bols_part8= @inverse(@transpose(x_part8)*x_part8)*@transpose(x_part8)*y
vector bols_part9= @inverse(@transpose(x_part9)*x_part9)*@transpose(x_part9)*y
vector bols_part10= @inverse(@transpose(x_part10)*x_part10)*@transpose(x_part10)*y


matrix x_beta_part1=x_part1*bols_part1
matrix x_beta_part2=x_part2*bols_part2
matrix x_beta_part3=x_part3*bols_part3
matrix x_beta_part4=x_part4*bols_part4
matrix x_beta_part5=x_part5*bols_part5
matrix x_beta_part6=x_part6*bols_part6
matrix x_beta_part7=x_part7*bols_part7
matrix x_beta_part8=x_part8*bols_part8
matrix x_beta_part9=x_part9*bols_part9
matrix x_beta_part10=x_part10*bols_part10


matrix(obs_l1,10) x_ave
matplace(x_ave,x_beta_part1,1,1)
matplace(x_ave,x_beta_part2,1,2)
```

```
matplace(x_ave,x_beta_part3,1,3)
matplace(x_ave,x_beta_part4,1,4)
matplace(x_ave,x_beta_part5,1,5)
matplace(x_ave,x_beta_part6,1,6)
matplace(x_ave,x_beta_part7,1,7)
matplace(x_ave,x_beta_part8,1,8)
matplace(x_ave,x_beta_part9,1,9)
matplace(x_ave,x_beta_part10,1,10)

vector bols_ave= @inverse(@transpose(x_ave)*x_ave)*@transpose(x_ave)*y      'unconstrained
vector cbols_ave= bols_ave-(@transpose(x_ave)*x_ave)*q*@inverse(@transpose(q)*(@transpose(x_ave)*x_ave)*q)*(@transpose(q)*bols_ave-one)    'constrained

vector(110) bnew
bnew(1)=cbols_ave(1)*bols_part1(1)
bnew(2)=cbols_ave(1)*bols_part1(2)
bnew(3)=cbols_ave(1)*bols_part1(3)
bnew(4)=cbols_ave(1)*bols_part1(4)
bnew(5)=cbols_ave(1)*bols_part1(5)
bnew(6)=cbols_ave(1)*bols_part1(6)
bnew(7)=cbols_ave(1)*bols_part1(7)
bnew(8)=cbols_ave(1)*bols_part1(8)
bnew(9)=cbols_ave(1)*bols_part1(9)
bnew(10)=cbols_ave(1)*bols_part1(10)
bnew(11)=cbols_ave(1)*bols_part1(11)
```

```
bnew(12)=cbols_ave(2)*bols_part2(1)
bnew(13)=cbols_ave(2)*bols_part2(2)
bnew(14)=cbols_ave(2)*bols_part2(3)
bnew(15)=cbols_ave(2)*bols_part2(4)
bnew(16)=cbols_ave(2)*bols_part2(5)
bnew(17)=cbols_ave(2)*bols_part2(6)
bnew(18)=cbols_ave(2)*bols_part2(7)
bnew(19)=cbols_ave(2)*bols_part2(8)
bnew(20)=cbols_ave(2)*bols_part2(9)
bnew(21)=cbols_ave(2)*bols_part2(10)
bnew(22)=cbols_ave(2)*bols_part2(11)

bnew(23)=cbols_ave(3)*bols_part3(1)
bnew(24)=cbols_ave(3)*bols_part3(2)
bnew(25)=cbols_ave(3)*bols_part3(3)
bnew(26)=cbols_ave(3)*bols_part3(4)
bnew(27)=cbols_ave(3)*bols_part3(5)
bnew(28)=cbols_ave(3)*bols_part3(6)
bnew(29)=cbols_ave(3)*bols_part3(7)
bnew(30)=cbols_ave(3)*bols_part3(8)
bnew(31)=cbols_ave(3)*bols_part3(9)
bnew(32)=cbols_ave(3)*bols_part3(10)
bnew(33)=cbols_ave(3)*bols_part3(11)

bnew(34)=cbols_ave(4)*bols_part4(1)
bnew(35)=cbols_ave(4)*bols_part4(2)
bnew(36)=cbols_ave(4)*bols_part4(3)
bnew(37)=cbols_ave(4)*bols_part4(4)
bnew(38)=cbols_ave(4)*bols_part4(5)
```

bnew(39)=cbols_ave(4)*bols_part4(6)

bnew(40)=cbols_ave(4)*bols_part4(7)

bnew(41)=cbols_ave(4)*bols_part4(8)

bnew(42)=cbols_ave(4)*bols_part4(9)

bnew(43)=cbols_ave(4)*bols_part4(10)

bnew(44)=cbols_ave(4)*bols_part4(11)

bnew(45)=cbols_ave(5)*bols_part5(1)

bnew(46)=cbols_ave(5)*bols_part5(2)

bnew(47)=cbols_ave(5)*bols_part5(3)

bnew(48)=cbols_ave(5)*bols_part5(4)

bnew(49)=cbols_ave(5)*bols_part5(5)

bnew(50)=cbols_ave(5)*bols_part5(6)

bnew(51)=cbols_ave(5)*bols_part5(7)

bnew(52)=cbols_ave(5)*bols_part5(8)

bnew(53)=cbols_ave(5)*bols_part5(9)

bnew(54)=cbols_ave(5)*bols_part5(10)

bnew(55)=cbols_ave(5)*bols_part5(11)

bnew(56)=cbols_ave(6)*bols_part6(1)

bnew(57)=cbols_ave(6)*bols_part6(2)

bnew(58)=cbols_ave(6)*bols_part6(3)

bnew(59)=cbols_ave(6)*bols_part6(4)

bnew(60)=cbols_ave(6)*bols_part6(5)

bnew(61)=cbols_ave(6)*bols_part6(6)

bnew(62)=cbols_ave(6)*bols_part6(7)

bnew(63)=cbols_ave(6)*bols_part6(8)

bnew(64)=cbols_ave(6)*bols_part6(9)

bnew(65)=cbols_ave(6)*bols_part6(10)

bnew(66)=cbols_ave(6)*bols_part6(11)

bnew(67)=cbols_ave(7)*bols_part7(1)

bnew(68)=cbols_ave(7)*bols_part7(2)

bnew(69)=cbols_ave(7)*bols_part7(3)

bnew(70)=cbols_ave(7)*bols_part7(4)

bnew(71)=cbols_ave(7)*bols_part7(5)

bnew(72)=cbols_ave(7)*bols_part7(6)

bnew(73)=cbols_ave(7)*bols_part7(7)

bnew(74)=cbols_ave(7)*bols_part7(8)

bnew(75)=cbols_ave(7)*bols_part7(9)

bnew(76)=cbols_ave(7)*bols_part7(10)

bnew(77)=cbols_ave(7)*bols_part7(11)

bnew(78)=cbols_ave(8)*bols_part8(1)

bnew(79)=cbols_ave(8)*bols_part8(2)

bnew(80)=cbols_ave(8)*bols_part8(3)

bnew(81)=cbols_ave(8)*bols_part8(4)

bnew(82)=cbols_ave(8)*bols_part8(5)

bnew(83)=cbols_ave(8)*bols_part8(6)

bnew(84)=cbols_ave(8)*bols_part8(7)

bnew(85)=cbols_ave(8)*bols_part8(8)

bnew(86)=cbols_ave(8)*bols_part8(9)

bnew(87)=cbols_ave(8)*bols_part8(10)

bnew(88)=cbols_ave(8)*bols_part8(11)

bnew(89)=cbols_ave(9)*bols_part9(1)

bnew(90)=cbols_ave(9)*bols_part9(2)

bnew(91)=cbols_ave(9)*bols_part9(3)

```
bnew(92)=cbols_ave(9)*bols_part9(4)
bnew(93)=cbols_ave(9)*bols_part9(5)
bnew(94)=cbols_ave(9)*bols_part9(6)
bnew(95)=cbols_ave(9)*bols_part9(7)
bnew(96)=cbols_ave(9)*bols_part9(8)
bnew(97)=cbols_ave(9)*bols_part9(9)
bnew(98)=cbols_ave(9)*bols_part9(10)
bnew(99)=cbols_ave(9)*bols_part9(11)

bnew(100)=cbols_ave(10)*bols_part10(1)
bnew(101)=cbols_ave(10)*bols_part10(2)
bnew(102)=cbols_ave(10)*bols_part10(3)
bnew(103)=cbols_ave(10)*bols_part10(4)
bnew(104)=cbols_ave(10)*bols_part10(5)
bnew(105)=cbols_ave(10)*bols_part10(6)
bnew(106)=cbols_ave(10)*bols_part10(7)
bnew(107)=cbols_ave(10)*bols_part10(8)
bnew(108)=cbols_ave(10)*bols_part10(9)
bnew(109)=cbols_ave(10)*bols_part10(10)
bnew(110)=cbols_ave(10)*bols_part10(11)



b1_new(!i)=bnew(1)
b2_new(!i)=bnew(2)

'compute insample residuals
vector new_resids=x*bnew-y
```

scalar new_sqresids=@transpose(new_resids)*new_resids

'compute out of sample errors

scalar errornew=yfull(obs)-
(x1full(obs)*bnew(1)+x2full(obs)*bnew(2)+x3full(obs)*bnew(3)+x4full(obs)*bnew(4)+x5full(obs)*bnew(5)+x6full(obs)*bnew(6)+x7full(obs)*bnew(7)+x8full(obs)*bnew(8)+x9full(obs)*bnew(9)+x10full(obs)*bnew(10)+x11full(obs)*bnew(11)+x12full(obs)*bnew(12)+x13full(obs)*bnew(13)+x14full(obs)*bnew(14)+x15full(obs)*bnew(15)+x16full(obs)*bnew(16)+x17full(obs)*bnew(17)+x18full(obs)*bnew(18)+x19full(obs)*bnew(19)+x20full(obs)*bnew(20)+x21full(obs)*bnew(21)+x22full(obs)*bnew(22)+x23full(obs)*bnew(23)+x24full(obs)*bnew(24)+x25full(obs)*bnew(25)+x26full(obs)*bnew(26)+x27full(obs)*bnew(27)+x28full(obs)*bnew(28)+x29full(obs)*bnew(29)+x30full(obs)*bnew(30)+x31full(obs)*bnew(31)+x32full(obs)*bnew(32)+x33full(obs)*bnew(33)+x34full(obs)*bnew(34)+x35full(obs)*bnew(35)+x36full(obs)*bnew(36)+x37full(obs)*bnew(37)+x38full(obs)*bnew(38)+x39full(obs)*bnew(39)+x40full(obs)*bnew(40)+x41full(obs)*bnew(41)+x42full(obs)*bnew(42)+x43full(obs)*bnew(43)+x44full(obs)*bnew(44)+x45full(obs)*bnew(45)+x46full(obs)*bnew(46)+x47full(obs)*bnew(47)+x48full(obs)*bnew(48)+x49full(obs)*bnew(49)+x50full(obs)*bnew(50)+x51full(obs)*bnew(51)+x52full(obs)*bnew(52)+x53full(obs)*bnew(53)+x54full(obs)*bnew(54)+x55full(obs)*bnew(55)+x56full(obs)*bnew(56)+x57full(obs)*bnew(57)+x58full(obs)*bnew(58)+x59full(obs)*bnew(59)+x60full(obs)*bnew(60)+x61full(obs)*bnew(61)+x62full(obs)*bnew(62)+x63full(obs)*bnew(63)+x64full(obs)*bnew(64)+x65full(obs)*bnew(65)+x66full(obs)*bnew(66)+x67full(obs)*bnew(67)+x68full(obs)*bnew(68)+x69full(obs)*bnew(69)+x70full(obs)*bnew(70)+x71full(obs)*bnew(71)+x72full(obs)*bnew(72)+x73full(obs)*bnew(73)+x74full(obs)*bnew(74)+x75full(obs)*bnew(75)+x76full(obs)*bnew(76)+x77full(obs)*bnew(77)+x78full(obs)*bnew(78)+x79full(obs)*bnew(79)+x80full(obs)*bnew(80)+x81full(obs)*bnew(81)+x82full(obs)*bnew(82)+x83full(obs)*bnew(83)+x84full(obs)*bnew(84)+x85full(obs)*bnew(85)+x86full(obs)*bnew(86)+x87full(obs)*bnew(87)+x88full(obs)*bnew(88)+x89full(obs)*bnew(89)+x90full(obs)*bnew(90)+x91full(obs)*bnew(91)+x92full(obs)*bnew(92)+x93full(obs)*bnew(93)+x94full(obs)*bnew(94)+x95full(obs)*bnew(95)+x96full(obs)*bnew(96)+x97full(obs)*bnew(97)+x98full(obs)*bnew(98)+x99full(obs)*bnew(99)+x100full(obs)*bnew(100)+x101full(obs)*bnew(101)+x102full(obs)*bnew(102)+x103full(obs)*bnew(103)+x104full(obs)*bnew(104)+x105full(obs)*bnew(105)+x106full(obs)*bnew(106)+x107full(obs)*bnew(107)+x108full(obs)*bnew(108)+x109full(obs)*bnew(109)+x110full(obs)*bnew(110))

errors_new(!i)=errornew

errors_new_squared(!i)=errornew*errornew

errors_new_rootsquared(!i)=(errornew*errornew)^0.5

errors_new_squared_est1(!i)=new_sqresids/obs_l1+2*dof_est*1/obs_l1 'Mallows Cp estimate using FC DoF

errors_new_squared_est2(!i)=new_sqresids/obs_l1+2*dof_naive*1/obs_l1 'Mallows Cp estimate using simple parameter count

err_est1_diff(!i)=errors_new_squared(!i)-errors_new_squared_est1(!i)

err_est2_diff(!i)=errors_new_squared(!i)-errors_new_squared_est2(!i)

next

scalar ave_err_new_sq=@mean(errors_new_squared)

scalar ave_cp1=@mean(errors_new_squared_est1)

scalar ave_cp2=@mean(errors_new_squared_est2)

scalar ave_ratio_cp1=ave_cp1/ave_err_new_sq

scalar ave_ratio_cp2=ave_cp2/ave_err_new_sq

wfsave(2) c:\data\sim\sim4\var10_obs{%v}

next