

Nanthepony

b l a c k a n d w h i t e



name: <unnamed>
 log: C:\Users\com\Downloads\Untitled.smcl
 log type: smcl
 opened on: 25 Feb 2021, 03:55:28

1 . use "C:\Users\com\Downloads\assign5-1.dta", clear

2 . tsset time
 time variable: time, 1 to 1335
 delta: 1 unit

3 . gen dr=f.r-r
 (1 missing value generated)

4 . gmm (dr-{alpha}-{beta}*r) ((dr-{alpha}-{beta}*r)*r) ((dr-{alpha}-{beta}*r)^2-{sigma2
 > }*r^(2*{gamma})) (((dr-{alpha}-{beta}*r)^2-{sigma2}*r^(2*{gamma}))*r) winitial(ident
 > ity)
 note: 1 missing value returned for equation 1 at initial values
 note: 1 missing value returned for equation 2 at initial values
 note: 1 missing value returned for equation 3 at initial values
 note: 1 missing value returned for equation 4 at initial values

Step 1

numerical derivatives are approximate
 flat or discontinuous region encountered

Iteration 0: GMM criterion Q(b) = .00001173
 Iteration 1: GMM criterion Q(b) = 8.321e-06 (backed up)
 Iteration 2: GMM criterion Q(b) = 6.043e-06 (not concave)
 Iteration 3: GMM criterion Q(b) = 1.604e-06
 Iteration 4: GMM criterion Q(b) = 1.662e-09
 Iteration 5: GMM criterion Q(b) = 1.344e-13

Step 2

Iteration 0: GMM criterion Q(b) = 3.899e-10
 Iteration 1: GMM criterion Q(b) = 4.098e-18

note: model is exactly identified

GMM estimation

black and white model

Number of parameters = 4
 Number of moments = 4
 Initial weight matrix: Identity
 GMM weight matrix: Robust
 Number of obs = 1,334

	Coef.	Robust Std. Err.	z	P> z	[95% Conf. Interval]	
/alpha	-.0023725	.0011574	-2.05	0.040	-.0046409	-.0001041
/beta	.0004291	.0002873	1.49	0.135	-.000134	.0009922
/sigma2	.0005043	.000324	1.56	0.120	-.0001307	.0011393
/gamma	.0985177	.1823933	0.54	0.589	-.2589666	.456002

Instruments for equation 1: _cons
 Instruments for equation 2: _cons
 Instruments for equation 3: _cons
 Instruments for equation 4: _cons

5 . est store unrestricted

```
6 . gmm (dr-{alpha}) ((dr-{alpha})*r) ((dr-{alpha})^2-{sigma2}) (((dr-{alpha})^2-{sigma2}
> ))*r) winitial(identity)
note: 1 missing value returned for equation 1 at initial values
note: 1 missing value returned for equation 2 at initial values
note: 1 missing value returned for equation 3 at initial values
note: 1 missing value returned for equation 4 at initial values
```

Step 1

```
Iteration 0: GMM criterion Q(b) = .00001173
Iteration 1: GMM criterion Q(b) = 4.045e-08
Iteration 2: GMM criterion Q(b) = 4.044e-08
```

Step 2

```
Iteration 0: GMM criterion Q(b) = .00798141
Iteration 1: GMM criterion Q(b) = .00552368
Iteration 2: GMM criterion Q(b) = .00552368
```

GMM estimation

```
Number of parameters = 2
Number of moments = 4
Initial weight matrix: Identity
GMM weight matrix: Robust
Number of obs = 1,334
```

	Coef.	Robust Std. Err.	z	P> z	[95% Conf. Interval]	
/alpha	-.0008137	.0006821	-1.19	0.233	-.0021507	.0005232
/sigma2	.0004277	.0002902	1.47	0.141	-.0001412	.0009965

```
Instruments for equation 1: _cons
Instruments for equation 2: _cons
Instruments for equation 3: _cons
Instruments for equation 4: _cons
```

7 . estat overid

Test of overidentifying restriction:

Hansen's J chi2(2) = 7.36859 (p = 0.0251)

H₀ rejected, merton is less appropriate model

8 . est store merton

```
9 . gmm (dr-{alpha}-{beta}*r) ((dr-{alpha}-{beta}*r)*r) ((dr-{alpha}-{beta}*r)^2-{sigma2}
> )) ((dr-{alpha}-{beta}*r)^2-{sigma2})*r) winitial(identity)
note: 1 missing value returned for equation 1 at initial values
note: 1 missing value returned for equation 2 at initial values
note: 1 missing value returned for equation 3 at initial values
note: 1 missing value returned for equation 4 at initial values
```

Step 1

```
Iteration 0: GMM criterion Q(b) = .00001173
Iteration 1: GMM criterion Q(b) = 3.336e-10
Iteration 2: GMM criterion Q(b) = 3.273e-10
```

Step 2

```
Iteration 0: GMM criterion Q(b) = .00063051
Iteration 1: GMM criterion Q(b) = .00020488
Iteration 2: GMM criterion Q(b) = .00020488
```

GMM estimation

```
Number of parameters = 3
Number of moments = 4
Initial weight matrix: Identity
GMM weight matrix: Robust
Number of obs = 1,334
```

	Coef.	Robust Std. Err.	z	P> z	[95% Conf. Interval]	
/alpha	-.0026994	.0009734	-2.77	0.006	-.0046072	-.0007915
/beta	.0005368	.0001999	2.69	0.007	.000145	.0009286
/sigma2	.0005887	.0002977	1.98	0.048	5.20e-06	.0011722

Instruments for equation 1: _cons
 Instruments for equation 2: _cons
 Instruments for equation 3: _cons
 Instruments for equation 4: _cons

10. estat overid

Test of overidentifying restriction:

Hansen's J chi2(1) = .273315 (p = 0.6011)

H. rejected Vasicek is appropriate

11. est store vasicek

12. gmm (dr-{alpha}-{beta}*r) ((dr-{alpha}-{beta}*r)*r) ((dr-{alpha}-{beta}*r)^2-{sigma2
 > }*r) (((dr-{alpha}-{beta}*r)^2-{sigma2}*r)*r) winitial(identity)
 note: 1 missing value returned for equation 1 at initial values
 note: 1 missing value returned for equation 2 at initial values
 note: 1 missing value returned for equation 3 at initial values
 note: 1 missing value returned for equation 4 at initial values

Step 1

Iteration 0: GMM criterion Q(b) = .00001173
 Iteration 1: GMM criterion Q(b) = 3.349e-09
 Iteration 2: GMM criterion Q(b) = 3.343e-09

Step 2

Iteration 0: GMM criterion Q(b) = .00651703
 Iteration 1: GMM criterion Q(b) = .00164197
 Iteration 2: GMM criterion Q(b) = .00164196

GMM estimation

Number of parameters = 3

Number of moments = 4

Initial weight matrix: Identity

Number of obs = 1,334

GMM weight matrix: Robust

	Coef.	Robust Std. Err.	z	P> z	[95% Conf. Interval]	
/alpha	-.0010252	.0007112	-1.44	0.149	-.0024191	.0003686
/beta	.0002288	.0002532	0.90	0.366	-.0002675	.000725
/sigma2	.0000917	.0000646	1.42	0.156	-.000035	.0002183

Instruments for equation 1: _cons
 Instruments for equation 2: _cons
 Instruments for equation 3: _cons
 Instruments for equation 4: _cons

13. estat overid

Test of overidentifying restriction:

Hansen's J chi2(1) = 2.19038 (p = 0.1389)

H. rejected appropriate

```
14. gmm (dr) ((dr)*r) ((dr)^2-{sigma2}*r^2) (((dr)^2-{sigma2}*r^2)*r) winitial(identity)
note: no parameters in equation 1
note: no parameters in equation 2
note: 1 missing value returned for equation 1 at initial values
note: 1 missing value returned for equation 2 at initial values
note: 1 missing value returned for equation 3 at initial values
note: 1 missing value returned for equation 4 at initial values
```

Step 1

```
Iteration 0: GMM criterion Q(b) = .00001173
Iteration 1: GMM criterion Q(b) = 5.688e-06
Iteration 2: GMM criterion Q(b) = 5.688e-06
```

Step 2

```
Iteration 0: GMM criterion Q(b) = .00932249
Iteration 1: GMM criterion Q(b) = .00344401
Iteration 2: GMM criterion Q(b) = .00344401
```

GMM estimation

```
Number of parameters = 1
Number of moments = 4
Initial weight matrix: Identity Number of obs = 1,334
GMM weight matrix: Robust
```

	Coef.	Robust Std. Err.	z	P> z	[95% Conf. Interval]	
/sigma2	.0000162	7.20e-06	2.25	0.025	2.08e-06	.0000303

```
Instruments for equation 1: _cons
Instruments for equation 2: _cons
Instruments for equation 3: _cons
Instruments for equation 4: _cons
```

```
15. estat overid
```

Test of overidentifying restriction:

Hansen's J chi2(3) = 4.59432 (p = 0.2040)

H₀ rejected appropriate model

```
16. est store dothan
```

```
17.
```

```
18. est store GBM
```

```
19. gmm (dr-{alpha}-{beta}*r) ((dr-{alpha}-{beta}*r)*r) ((dr-{alpha}-{beta}*r)^2-{sigma2}
> *r^2) (((dr-{alpha}-{beta}*r)^2-{sigma2}*r^2)*r) winitial(identity)
note: 1 missing value returned for equation 1 at initial values
note: 1 missing value returned for equation 2 at initial values
note: 1 missing value returned for equation 3 at initial values
note: 1 missing value returned for equation 4 at initial values
```

Step 1

```
Iteration 0: GMM criterion Q(b) = .00001173
Iteration 1: GMM criterion Q(b) = 1.062e-08
Iteration 2: GMM criterion Q(b) = 1.061e-08
```

Step 2

```
Iteration 0: GMM criterion Q(b) = .0202404
Iteration 1: GMM criterion Q(b) = .00259237
Iteration 2: GMM criterion Q(b) = .00259234
```

GMM estimation

Number of parameters = 3
 Number of moments = 4
 Initial weight matrix: **Identity** Number of obs = 1,334
 GMM weight matrix: **Robust**

	Coef.	Robust Std. Err.	z	P> z	[95% Conf. Interval]	
/alpha	-.0008979	.0008413	-1.07	0.286	-.0025469	.000751
/beta	.0002882	.0002774	1.04	0.299	-.0002555	.0008319
/sigma2	8.91e-06	.0000103	0.87	0.387	-.0000113	.0000291

Instruments for equation 1: **_cons**
 Instruments for equation 2: **_cons**
 Instruments for equation 3: **_cons**
 Instruments for equation 4: **_cons**

20. estat overid

Test of overidentifying restriction:

Hansen's J chi2(1) = 3.45819 (p = 0.0629)

*p > 0.05
 H rejected*

21. est store brennan

22. gmm (dr) ((dr)*r) ((dr)^2-{sigma2}*r^(2*1.5)) ((dr)^2-{sigma2}*r^(2*1.5))*r)winitia
 > l(identity)
 note: no parameters in equation 1
 note: no parameters in equation 2
 note: 1 missing value returned for equation 1 at initial values
 note: 1 missing value returned for equation 2 at initial values
 note: 1 missing value returned for equation 3 at initial values
 note: 1 missing value returned for equation 4 at initial values

Step 1

Iteration 0: GMM criterion Q(b) = .00001173
 Iteration 1: GMM criterion Q(b) = 5.694e-06
 Iteration 2: GMM criterion Q(b) = 5.694e-06

Step 2

Iteration 0: GMM criterion Q(b) = .01561186
 Iteration 1: GMM criterion Q(b) = .0038055
 Iteration 2: GMM criterion Q(b) = .0038055

GMM estimation

Number of parameters = 1
 Number of moments = 4
 Initial weight matrix: **Identity** Number of obs = 1,334
 GMM weight matrix: **Robust**

	Coef.	Robust Std. Err.	z	P> z	[95% Conf. Interval]	
/sigma2	2.70e-06	1.26e-06	2.15	0.032	2.35e-07	5.16e-06

Instruments for equation 1: **_cons**
 Instruments for equation 2: **_cons**
 Instruments for equation 3: **_cons**
 Instruments for equation 4: **_cons**

23. estat overid

Test of overidentifying restriction:

Hansen's J chi2(3) = **5.07654** (p = **0.1663**)

W. R. J. 1663

24. est store CIR_VR

25. gmm (dr-{beta}*r) ((dr-{beta}*r)*r) ((dr-{beta}*r)^2-{sigma2}*r^(2*{gamma})) ((dr-{b
> eta}*r)^2-{sigma2}*r^(2*{gamma}))*r) winitial(identity)
note: 1 missing value returned for equation 1 at initial values
note: 1 missing value returned for equation 2 at initial values
note: 1 missing value returned for equation 3 at initial values
note: 1 missing value returned for equation 4 at initial values

Step 1

numerical derivatives are approximate
flat or discontinuous region encountered

Iteration 0: GMM criterion Q(b) = **.00001173**
Iteration 1: GMM criterion Q(b) = **8.627e-06** (backed up)
Iteration 2: GMM criterion Q(b) = **6.127e-06** (not concave)
Iteration 3: GMM criterion Q(b) = **5.400e-06** (backed up)
Iteration 4: GMM criterion Q(b) = **5.310e-06**

Step 2

Iteration 0: GMM criterion Q(b) = **.01236133**
Iteration 1: GMM criterion Q(b) = **.01075751**
Iteration 2: GMM criterion Q(b) = **.00760436**
Iteration 3: GMM criterion Q(b) = **.00678694**
Iteration 4: GMM criterion Q(b) = **.00326882**
Iteration 5: GMM criterion Q(b) = **.00316225**
Iteration 6: GMM criterion Q(b) = **.00313882**
Iteration 7: GMM criterion Q(b) = **.0031388**

GMM estimation

Number of parameters = **3**

Number of moments = **4**

Initial weight matrix: **Identity**

Number of obs = **1,334**

GMM weight matrix: **Robust**

	Coef.	Robust Std. Err.	z	P> z	[95% Conf. Interval]	
/beta	-.0000453	.0001702	-0.27	0.790	-.0003789	.0002883
/sigma2	.0000881	.0001436	0.61	0.539	-.0001933	.0003696
/gamma	.5717551	.3668112	1.56	0.119	-.1471817	1.290692

Instruments for equation 1: **_cons**

Instruments for equation 2: **_cons**

Instruments for equation 3: **_cons**

Instruments for equation 4: **_cons**

26. estat overid

Test of overidentifying restriction:

Hansen's J chi2(1) = **4.18715** (p = **0.0407**)

27. est store CEV

28. est table unrestricted merton vasicek CIR_SR dothan GBM brennan CIR_VR CEV,star(0.1
> 0.05 0.01)
estimation result CIR_SR not found
r(111);

29. est store CIR_VR

30. est table unrestricted merton vasicek CIR_SR dothan GBM brennan CIR_VR CEV,star(0.1
> 0.05 0.01)
estimation result CIR_SR not found
r(111);

31. est store CIR_SR

32. est table unrestricted merton vasicek CIR_SR dothan GBM brennan CIR_VR CEV,star(0.1
> 0.05 0.01)

Variable	unrestricted	merton	vasicek	CIR_SR	doth
alpha					
_cons	-.00237253**	-.00081372	-.00269937***		
beta					
_cons	.00042912		.00053681***	-.00004534	
sigma2					
_cons	.00050427	.00042766	.00058872**	.00008815	.00001
gamma					
_cons	.09851773			.57175507	

legend: * p<.1; ** p<.05; *** p<.01

Variable	GBM	brennan	CIR_VR	CEV
alpha				
_cons		-.00089794		
beta				
_cons		.0002882	-.00004534	-.00004534
sigma2				
_cons	.00001618**	8.909e-06	.00008815	.00008815
gamma				
_cons			.57175507	.57175507

legend: * p<.1; ** p<.05; *** p<.01

```

33. gmm (dr-{alpha}-{beta}*r) ((dr-{alpha}-{beta}*r)*r) ((dr-{alpha}-{beta}*r)^2-{sigma2
> }*r^(2*{gamma})) (((dr-{alpha}-{beta}*r)^2-{sigma2}*r^(2*{gamma}))*r)winitial(identi
> ty)
note: 1 missing value returned for equation 1 at initial values
note: 1 missing value returned for equation 2 at initial values
note: 1 missing value returned for equation 3 at initial values
note: 1 missing value returned for equation 4 at initial values

```

Step 1

numerical derivatives are approximate

flat or discontinuous region encountered

```

Iteration 0:  GMM criterion Q(b) =  .00001173
Iteration 1:  GMM criterion Q(b) =  8.321e-06  (backed up)
Iteration 2:  GMM criterion Q(b) =  6.043e-06  (not concave)
Iteration 3:  GMM criterion Q(b) =  1.604e-06
Iteration 4:  GMM criterion Q(b) =  1.662e-09
Iteration 5:  GMM criterion Q(b) =  1.344e-13

```

Step 2

```

Iteration 0:  GMM criterion Q(b) =  3.899e-10
Iteration 1:  GMM criterion Q(b) =  4.098e-18

```

note: model is exactly identified

GMM estimation

```

Number of parameters =  4
Number of moments     =  4
Initial weight matrix: Identity          Number of obs   =  1,334
GMM weight matrix:    Robust

```

	Coef.	Robust Std. Err.	z	P> z	[95% Conf. Interval]	
/alpha	-.0023725	.0011574	-2.05	0.040	-.0046409	-.0001041
/beta	.0004291	.0002873	1.49	0.135	-.000134	.0009922
/sigma2	.0005043	.000324	1.56	0.120	-.0001307	.0011393
/gamma	.0985177	.1823933	0.54	0.589	-.2589666	.456002

```

Instruments for equation 1: _cons
Instruments for equation 2: _cons
Instruments for equation 3: _cons
Instruments for equation 4: _cons

```

34. *test unrestricted vs Merton

35. test (_b[/beta]=0) (_b[/gamma]=0)

```

( 1) [beta]_cons = 0
( 2) [gamma]_cons = 0

```

```

      chi2( 2) =    7.92
      Prob > chi2 =   0.0191

```

Reject

36. *test unrestricted vs Vasicek

37. *test unrestricted vs Vasicek

38. test (_b[/gamma]=0)

(1) [gamma]_cons = 0

```

      chi2( 1) =    0.29
      Prob > chi2 =   0.5891

```

Not reject

39. *test unrestricted vs CIR SR

40. test (_b[/gamma]=0.5)

(1) [gamma]_cons = .5

chi2(1) = 4.85
Prob > chi2 = 0.0277

reject

41. *test unrestricted vs Dothan

42. test (_b[/alpha]=0) (_b[/beta]=0) (_b[/gamma]=1)

(1) [alpha]_cons = 0

(2) [beta]_cons = 0

(3) [gamma]_cons = 1

chi2(3) = 34.04
Prob > chi2 = 0.0000

reject

43. *test unrestricted vs

44. *test unrestricted vs GBM

45. *test unrestricted vs GBM

46. test (_b[/alpha]=0) (_b[/gamma]=1)

(1) [alpha]_cons = 0

(2) [gamma]_cons = 1

chi2(2) = 27.48
Prob > chi2 = 0.0000

rejects

47. *test unrestricted vs Brennan & Schwartz

48. test (_b[/gamma]=1)

(1) [gamma]_cons = 1

chi2(1) = 24.43
Prob > chi2 = 0.0000

reject

49. *test unrestricted vs CIR VR

50. test (_b[/alpha]=0) (_b[/beta]=0) (_b[/gamma]=1.5)

(1) [alpha]_cons = 0

(2) [beta]_cons = 0

(3) [gamma]_cons = 1.5

chi2(3) = 95.71
Prob > chi2 = 0.0000

rejects

51. *test unrestricted vs CEV

52. test (_b[/alpha]=0)

(1) [alpha]_cons = 0

chi2(1) = 4.20
Prob > chi2 = 0.0404

reject

∴ Only Vasicek model fail to reject H_0 , It's the most appropriate model

53. save "C:\Users\com\Downloads\Assignment5.dta"
file C:\Users\com\Downloads\Assignment5.dta saved

54. use "C:\Users\com\Downloads\assign5-2.dta", clear

55. tsset t
time variable: t, 1 to 500
delta: 1 unit

56. reg y x

Source	SS	df	MS	Number of obs	=	500
Model	132481.702	1	132481.702	F(1, 498)	=	449.66
Residual	146722.774	498	294.624043	Prob > F	=	0.0000
				R-squared	=	0.4745
				Adj R-squared	=	0.4734
Total	279204.475	499	559.528007	Root MSE	=	17.165

y	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
x	5.431333	.2561312	21.21	0.000	4.928102	5.934564
_cons	-33.31333	2.673868	-12.46	0.000	-38.56678	-28.05988

57. predict u, resid

58. corr
(obs=500)

	t	y	x	z1	z2	z3	z4	u
t	1.0000							
y	0.0681	1.0000						
x	0.0517	0.6888	1.0000					
z1	0.0661	0.2002	0.7215	1.0000				
z2	0.0062	0.1203	0.2352	0.1937	1.0000			
z3	0.0387	0.9214	0.5487	0.0918	0.0933	1.0000		
z4	0.0143	0.1887	0.6954	0.4738	0.1607	0.0828	1.0000	
u	0.0447	0.7249	-0.0000	-0.4095	-0.0575	0.7496	-0.4006	1.0000

59. ivregress gmm y (x=z1 z2 z3 z4)

Instrumental variables (GMM) regression

Number of obs = 500
Wald chi2(1) = 415.07
Prob > chi2 = 0.0000
R-squared = 0.4710
Root MSE = 17.187

y	Coef.	Robust Std. Err.	z	P> z	[95% Conf. Interval]	
x	5.262505	.2583042	20.37	0.000	4.756238	5.768772
_cons	-30.33032	2.737777	-11.08	0.000	-35.69627	-24.96438

Instrumented: x
Instruments: z1 z2 z3 z4

60. estat overid

Test of overidentifying restriction:

Hansen's J chi2(3) = **163.488** (p = **0.0000**)

reject, since it is not appropriate

61. save "C:\Users\com\Downloads\assign5-2.dta", replace
file C:\Users\com\Downloads\assign5-2.dta saved

62. save "C:\Users\com\Downloads\Assignment 5.dta"
file C:\Users\com\Downloads\Assignment 5.dta saved

63. log close
name: <unnamed>
log: C:\Users\com\Downloads\Untitled.smcl
log type: smcl
closed on: 25 Feb 2021, 05:08:38

b.) Since, all of IV (z_1, z_2, z_3, z_4) are correlated with u
There are no appropriate IV in this case

c.) OLS is more appropriate in this case

$E(x|u) = 0$ so the results are unbiased unlike GLS