

Vector Error Correction Mechanism (VECM) Models

Do file command in generating VECM relationship:

$$\Delta y_t = 0.1 + 0.2\Delta y_{t-1} + 0.3\Delta x_{t-1} - 0.5(y_{t-1} - 0.1 - 0.5x_{t-1}) + e_{1t},$$

$$\Delta x_t = 0.2 + 0.3\Delta y_{t-1} + 0.2\Delta x_{t-1} + 0.5(y_{t-1} - 0.1 - 0.5x_{t-1}) + e_{2t}$$

```

set obs 500
g t=_n
tsset t
mat C=(1, 0.7\0.7, 1)
corr2data e1 e2, n(500) mean(0 0) sds(4 5) corr(C)
g x=0 in 1
g y=0 in 1
g dx=0 in 1
g dy=0 in 1
forvalue i=2(1)500 {
  replace dy=0.1+0.2*1.dy+0.3*1.dx-0.5*(1.y-0.1-0.5*1.x)+e1 in `i'
  replace dx=0.2+0.3*1.dy+0.2*1.dx+0.5*(1.y-0.1-0.5*1.x)+e2 in `i'
  replace y=1.y+dy in `i'
  replace x=1.x+dx in `i'
}

```

Johansen Cointegration Test

*Linear trend

```
. vecrank y x, trend(t) lags(1/1) max
```

Johansen tests for cointegration

```
Trend: trend                                Number of obs =    499
Sample:  2 - 500                             Lags =            1
```

```
-----
                    5%
maximum            trace    critical
rank    parms      LL      eigenvalue  statistic  value
  0         4    -2976.1469          .      332.5337   18.17
  1         7    -2809.9437    0.48631    0.1273*    3.74
  2         8    -2809.8801    0.00026
-----
```

```
-----
                    5%
maximum            max      critical
rank    parms      LL      eigenvalue  statistic  value
  0         4    -2976.1469          .      332.4064   16.87
  1         7    -2809.9437    0.48631    0.1273    3.74
  2         8    -2809.8801    0.00026
-----
```

*Restricted trend

```
. vecrank y x, trend(rt) lags(1/1) max
```

Johansen tests for cointegration

```
Trend: rtrend                                Number of obs =    499
Sample:  2 - 500                             Lags =            1
```

```
-----
                    5%
maximum            trace    critical
rank    parms      LL      eigenvalue  statistic  value
  0         2    -2978.5472          .      337.3343   25.32
  1         6    -2811.3047    0.48845    2.8493*   12.25
  2         8    -2809.8801    0.00569
-----
```

```
-----
                    5%
maximum            max      critical
rank    parms      LL      eigenvalue  statistic  value
-----
```


0	0	-2979.6072	.	335.0946	11.44
1	3	-2812.0599	0.48907	0.0581	3.84
2	4	-2812.0309	0.00012		

Vector Error Correction Model (VECM)

. vec y x

Vector error-correction model

Sample: 3 - 500	Number of obs	=	498
Log likelihood = -2733.081	AIC	=	11.01237
Det(Sigma_ml) = 200.4317	HQIC	=	11.04224
	SBIC	=	11.08847

Equation	Parms	RMSE	R-sq	chi2	P>chi2
D_y	4	4.00559	0.2426	158.268	0.0000
D_x	4	4.99497	0.3968	325.0034	0.0000

		Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
D_y	_ce1						
	L1.	-.5083126	.0732752	-6.94	0.000	-.6519294	-.3646959
	y						
	LD.	.2106884	.0640058	3.29	0.001	.0852393	.3361375
	x						
	LD.	.3081108	.0358745	8.59	0.000	.2377981	.3784236
	_cons	.1296243	.1799531	0.72	0.471	-.2230773	.4823258
D_x	_ce1						
	L1.	.4093418	.0913741	4.48	0.000	.2302518	.5884317
	y						
	LD.	.3730464	.0798152	4.67	0.000	.2166115	.5294813
	x						
	LD.	.253335	.0447355	5.66	0.000	.1656551	.341015
	_cons	.1609649	.2244013	0.72	0.473	-.2788536	.6007834

Cointegrating equations

Equation	Parms	chi2	P>chi2
_ce1	1	53775.96	0.0000

Identification: beta is exactly identified

Johansen normalization restriction imposed

		Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
_ce1							
	y	1	.	.	.	.	.
	x	-.5001938	.002157	-231.90	0.000	-.5044214	-.4959662
	_cons	-.0503102	.	.	.	.	.


```

-----+-----
D_vms2 |
  _ce1 |
    L1. | -168742.7  85651.54  -1.97  0.049  -336616.6  -868.7359
  _cons |  .0001369  13433.22   0.00  1.000  -26328.62  26328.62
-----+-----
D_rp14 |
  _ce1 |
    L1. | -4.924644  3.384674  -1.45  0.146  -11.55848  1.709196
  _cons | -.8293151  .5308376  -1.56  0.118  -1.869738  .2111075
-----+-----

```

```

Cointegrating equations
Equation      Parms    chi2      P>chi2
-----+-----
  _ce1                4    133.5158  0.0000
-----+-----

```

Identification: beta is exactly identified
 Johansen normalization restriction imposed

```

-----+-----
      beta |      Coef.  Std. Err.      z    P>|z|      [95% Conf. Interval]
-----+-----
  _ce1 |
    inf |           1           .           .           .           .           .
    thco |  -.0083155  .0011756   -7.07  0.000   -.0106197  -.0060114
    neer |   .0050075  .0013058    3.83  0.000    .0024482   .0075667
    vms2 |  1.44e-07  3.44e-08    4.17  0.000    7.61e-08  2.11e-07
    rp14 |  -.0059911  .0015366   -3.90  0.000   -.0090027  -.0029795
  _cons |   -.27832           .           .           .           .           .
-----+-----

```