1.

```
. tsset time
        time variable:  time, 1 to 795
                delta:  1 unit

. g spot2 = spot-l.spot
(1 missing value generated)

. gen future2 = future-l.future
(1 missing value generated)

. gen rspot= spot2/l.spot
(1 missing value generated)

. gen rfuture = future2/l.future
(1 missing value generated)

. varsoc rspot rfuture, maxlag(5)
```

Selection-order criteria
Sample: 7 - 795 Number of obs = 789

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	4774.48				1.9e-08	-12.0975	-12.093	-12.0857
1	4837.65	126.33	4	0.000	1.6e-08	-12.2475	-12.2339	-12.212
2	4857.92	40.555	4	0.000	1.6e-08	-12.2888	-12.266	-12.2296
3	4882.17	48.486*	4	0.000	1.5e-08*	-12.3401*	-12.3082*	-12.2572*
4	4884.45	4.5566	4	0.336	1.5e-08	-12.3357	-12.2948	-12.2292
5	4886.05	3.2155	4	0.522	1.5e-08	-12.3297	-12.2796	-12.1994

Endogenous: rspot rfuture
Exogenous: _cons

lag 3 is the most appropriated, since SBIC is the lowest.

```
. var rspot rfuture, lag(1/3)
```

Vector autoregression

Sample: 5 - 795 Number of obs = 791
Log likelihood = 4893.31 AIC = -12.33707
FPE = 1.50e-08 HQIC = -12.30527
Det(Sigma_ml) = 1.45e-08 SBIC = -12.25435

Equation	Parms	RMSE	R-sq	chi2	P>chi2
rspot	7	.018581	0.0169	13.624	0.0341
rfuture	7	.0217	0.0338	27.62952	0.0001

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
rspot						
rspot						
L1.	.1282088	.1145511	1.12	0.263	-.0963071	.3527248
L2.	.2334538	.118681	1.97	0.049	.0008434	.4660643
L3.	-.1169759	.1100791	-1.06	0.288	-.332727	.0987753

rfuture						
L1.	-.0590319	.0980706	-0.60	0.547	-.2512466	.1331829
L2.	-.1415632	.1041653	-1.36	0.174	-.3457234	.062597
L3.	.1057702	.096238	1.10	0.272	-.0828529	.2943933
_cons	-.000025	.0006579	-0.04	0.970	-.0013144	.0012644
rfuture						
rspot						
L1.	.5741704	.1337768	4.29	0.000	.3119727	.8363682
L2.	.5086657	.1385999	3.67	0.000	.237015	.7803165
L3.	.0617779	.1285544	0.48	0.631	-.190184	.3137398
rfuture						
L1.	-.520118	.1145303	-4.54	0.000	-.7445933	-.2956428
L2.	-.4253538	.1216479	-3.50	0.000	-.6637794	-.1869283
L3.	-.0947954	.1123902	-0.84	0.399	-.3150762	.1254854
_cons	.0000732	.0007683	0.10	0.924	-.0014326	.001579

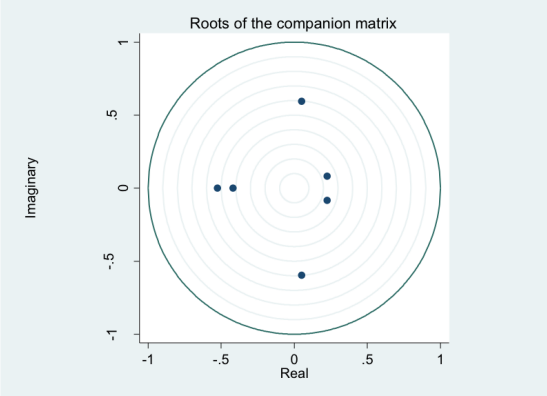
2.

```
. varstable, graph
```

Eigenvalue stability condition

Eigenvalue	Modulus
.05126276 + .5960908*i*	.598291
.05126276 - .5960908*i*	.598291
-.5255917	.525592
-.4199276	.419928
.2255423 + .0823411*i*	.240103
.2255423 - .0823411*i*	.240103

All the eigenvalues lie inside the unit circle.
VAR satisfies stability condition.




```
. vargranger
```

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
rspot	rfuture	4.8624	3	0.182
rspot	ALL	4.8624	3	0.182
rfuture	rspot	25.19	3	0.000
rfuture	ALL	25.19	3	0.000

rspot causes rfuture, p-value < 0.05

rfuture doesn't cause rspot, p-value > 0.05

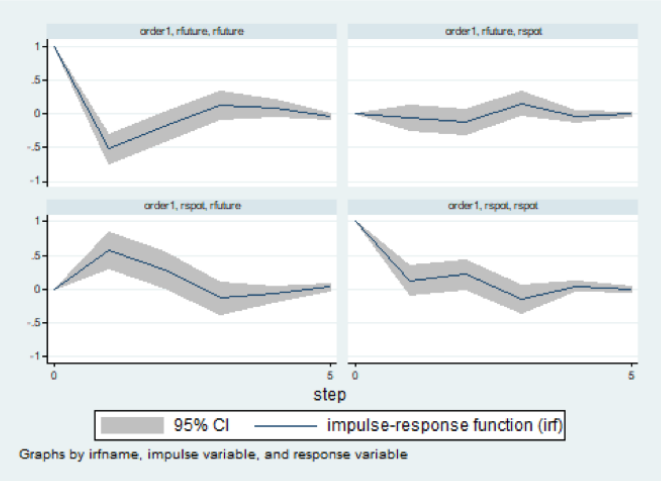
3

```
. irf create order1, order(rspot rfuture) step(5) set(irf01)
(file irf01.irf created)
(file irf01.irf now active)
(file irf01.irf updated)

. irf table irf, impulse(rspot rfuture) response(rspot rfuture)
```

Results from order1

step	(1) irf	(1) Lower	(1) Upper	(2) irf	(2) Lower	(2) Upper	(3) irf	(3) Lower	(3) Upper	(4) irf	(4) Lower	(4) Upper
0	1	1	1	0	0	0	0	0	0	1	1	1
1	.128209	-.096307	.352725	.57417	.311973	.836368	-.059032	-.251247	.133183	-.520118	-.744593	-.295643
2	.215997	-.004582	.436576	.283643	.022104	.545182	-.118428	-.30696	.070103	-.188725	-.412415	.034964
3	-.157378	-.363594	.048839	-.140741	-.388189	.106707	.161576	-.013545	.336696	.126573	-.084013	.337158
4	.044136	-.033389	.12166	-.074446	-.192648	.043755	-.035795	-.116425	.044835	.092632	-.027457	.212721
5	-.002029	-.037484	.033426	.03033	-.017472	.078132	.003637	-.027138	.034412	-.029808	-.073835	.014219

```
95% lower and upper bounds reported
(1) irfname = order1, impulse = rspot, and response = rspot
(2) irfname = order1, impulse = rspot, and response = rfuture
(3) irfname = order1, impulse = rfuture, and response = rspot
(4) irfname = order1, impulse = rfuture, and response = rfuture

. irf graph irf, impulse(rspot rfuture) response(rspot rfuture)
```



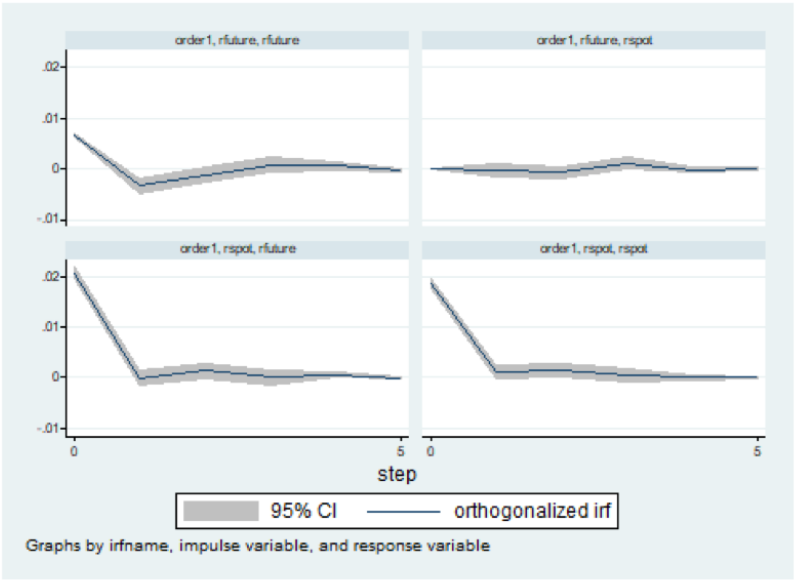

```
. irf table oirf, impulse(rspot rfuture) response(rspot rfuture)
```

Results from order1

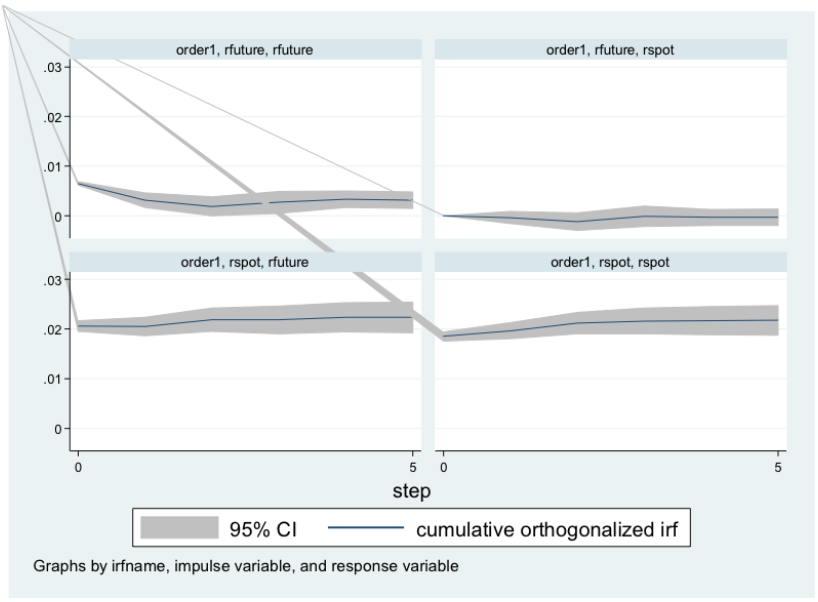
step	(1) oirf	(1) Lower	(1) Upper	(2) oirf	(2) Lower	(2) Upper	(3) oirf	(3) Lower	(3) Upper	(4) oirf	(4) Lower	(4) Upper
0	.018499	.017587	.019411	.020599	.019487	.021711	0	0	0	.006512	.006191	.006833
1	.001156	-.000134	.002445	-.000092	-.001615	.00143	-.000384	-.001636	.000867	-.003387	-.004858	-.001916
2	.001556	.000268	.002844	.00136	-.000159	.002878	-.000771	-.002	.000457	-.001229	-.002687	.000229
3	.000417	-.000872	.001706	3.7e-06	-.001515	.001522	.001052	-.000089	.002194	.000824	-.000548	.002196
4	.000079	-.000334	.000492	.000531	.000055	.001007	-.000233	-.000758	.000292	.000603	-.000179	.001386
5	.000037	-.000242	.000317	-.000053	-.000327	.000222	.000024	-.000177	.000224	-.000194	-.000481	.000093

```
95% lower and upper bounds reported
(1) irfname = order1, impulse = rspot, and response = rspot
(2) irfname = order1, impulse = rspot, and response = rfuture
(3) irfname = order1, impulse = rfuture, and response = rspot
(4) irfname = order1, impulse = rfuture, and response = rfuture
```

```
. irf graph oirf, impulse(rspot rfuture) response(rspot rfuture)
```




```
. irf graph coirf, impulse(rspot rfuture) response(rspot rfuture)
```



4.

```
. irf table fevd, impulse(rspot rfuture) response(rspot)
```

Results from order1

step	(1) fevd	(1) Lower	(1) Upper	(2) fevd	(2) Lower	(2) Upper
0	0	0	0	0	0	0
1	1	1	1	0	0	0
2	.99957	.99677	1.00237	.00043	-.00237	.00323
3	.997858	.991698	1.00402	.002142	-.004018	.008302
4	.994684	.985216	1.00415	.005316	-.004153	.014784
5	.994529	.984823	1.00424	.005471	-.004235	.015177

95% lower and upper bounds reported
(1) irfname = order1, impulse = rspot, and response = rspot
(2) irfname = order1, impulse = rfuture, and response = rspot

rspot have more impact than rfuture, and rfuture is insignificant

```
. irf table fevd, impulse(rspot rfuture) response(rfuture)
```

Results from order1

step	(1) fevd	(1) Lower	(1) Upper	(2) fevd	(2) Lower	(2) Upper
0	0	0	0	0	0	0
1	.909133	.897058	.921209	.090867	.078791	.102942
2	.887324	.863844	.910804	.112676	.089196	.136156
3	.884973	.861047	.908899	.115027	.091101	.138953
4	.883726	.859086	.908366	.116274	.091634	.140914
5	.883128	.858185	.908071	.116872	.091929	.141815

95% lower and upper bounds reported
(1) irfname = order1, impulse = rspot, and response = rfuture
(2) irfname = order1, impulse = rfuture, and response = rfuture

rspot have more impact than rfuture, Both are significant

5. Yes, the changing in Cholesky order will changes the results of oirt, coirt, and fevd, but not for irt. Because change in order will also change the cholesky factorization, which will affect oirt, coirt and fevd.