

Assignment 15

VARs Models

From the data set `assign_timeseries.dta`:

The following VARs models:

$$Y_t = A_0 + A_1 Y_{t-1} + \epsilon_t \quad (3)$$

where: $Y_t = \begin{pmatrix} rspot_t \\ rfuture_t \end{pmatrix}$, $A_0 = \begin{pmatrix} a_{10} \\ a_{20} \end{pmatrix}$, $A_1 = \begin{pmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{pmatrix}$, $\epsilon_t = \begin{pmatrix} e_{1t} \\ e_{2t} \end{pmatrix}$

1. Estimate VARs models using spot return (`rspot`) and future return (`rfuture`) as endogenous variables and determine the most appropriated lags models using SBIC.
2. Perform stability test and Granger exogeneity test.
3. Perform Impulse response function analysis (`irf`), Orthogonal impulse response function analysis (`oirf`), Cumulative impulse response function analysis (`coirf`), make interpretation of the analysis, and determine which variable has more impact (using Cholesky order – `rspot rfuture`).
4. Perform Forecast error variance decomposition (`fevd`) and determine variable that has more impact on each endogenous variable.
5. Determine whether changing Cholesky order from – “`rspot rfuture`” to “`rfuture rspot`” will change the results of `irf`, `oirf`, `coirf`, and `fevd`. Why? or why not?

rfuture 7 .02185 0.0331 27.10259 0.0001

	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	

rspot						
rspot						
L1.	.1158138	.1145326	1.01	0.312	-.1086659	.3402935
L2.	.2342177	.1187948	1.97	0.049	.0013842	.4670512
L3.	-.132153	.109794	-1.20	0.229	-.3473453	.0830393
rfuture						
L1.	-.0450696	.0984289	-0.46	0.647	-.2379867	.1478474
L2.	-.1360874	.1048123	-1.30	0.194	-.3415157	.0693409
L3.	.1212926	.0964991	1.26	0.209	-.0678423	.3104274
_cons	-.0003302	.000665	-0.50	0.619	-.0016337	.0009732

rfuture						
rspot						
L1.	.5575525	.1333146	4.18	0.000	.2962606	.8188444
L2.	.5012265	.1382758	3.62	0.000	.2302109	.7722421
L3.	.0574836	.127799	0.45	0.653	-.1929979	.3079651
rfuture						
L1.	-.5064931	.1145701	-4.42	0.000	-.7310464	-.2819398
L2.	-.4128686	.1220003	-3.38	0.001	-.6519848	-.1737523
L3.	-.0845194	.1123239	-0.75	0.452	-.3046703	.1356315
_cons	-.0005081	.0007741	-0.66	0.512	-.0020253	.0010091

. varstable, graph

Eigenvalue stability condition

Eigenvalue	Modulus
.05716836 + .5924961i	.595248
.05716836 - .5924961i	.595248
-.5535887	.553589
-.398608	.398608
.2235904 + .06073802i	.231693
.2235904 - .06073802i	.231693

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	5.2358	3	0.155
rspot	ALL	5.2358	3	0.155
rfuture	rspot	24.14	3	0.000
rfuture	ALL	24.14	3	0.000

```
. irf create order1, order(rspot rfuture) step(5) set(irf03)
(file irf03.irf created)
(file irf03.irf now active)
(file irf03.irf updated)
```

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

Results from order1

step	(1)			(2)		
	irf	Lower	Upper	irf	Lower	Upper
0	1	1	1	0	0	0
1	.115814	-.108666	.340294	.557553	.296261	.818844
-0.04507	-.237987	.147847				
2	.222502	.001797	.443207	.283402	.022833	.543972
-.11848	-.307934	.070975				
3	-.167907	-.373383	.037569	-.134148	-.379675	.111379
.174121	-.00119	.349431				
4	.052468	-.024646	.129582	-.071623	-.18827	.045025
-.04413	-.124463	.036203				
5	-.006796	-.044484	.030892	.025593	-.023228	.074415
.00795	-.024432	.040331				

step	(4)	(4)	(4)
irf	Lower	Upper	
0	1	1	1

1		-.506493	-.731046	-.28194	
2		-.181462	-.405283	.042359	
3		.127856	-.082049	.337761	
4		.088076	-.030991	.207142	
5		-.026202	-.070762	.018358	

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 graph oirf, impulse(rspot rfuture) response(rspot rfuture)
. irf graph coirf, impulse(rspot rfuture) response(rspot rfuture)
. 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	.999751	.997622	1.00188	.000249	-.001881	.002378
3	.998051	.992176	1.00393	.001949	-.003927	.007824
4	.994399	.984782	1.00402	.005601	-.004016	.015218
5	.994165	.984191	1.00414	.005835	-.00414	.015809

95% lower and upper bounds reported

- (1) irfname = order1, impulse = rspot, and response = rspot
- (2) irfname = order1, impulse = rfuture, and response = rspot

```
. 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	.909191	.897123	.921259	.090809	.078741	.102877
2	.888495	.865442	.911548	.111505	.088452	.134558
3	.886455	.862984	.909926	.113545	.090074	.137016
4	.885186	.86101	.909362	.114814	.090638	.13899

5	.884639	.860187	.909091	.115361	.090909	.139813	
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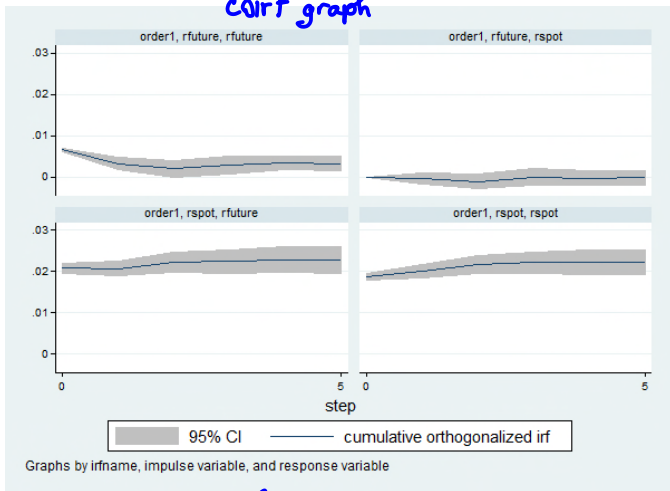
95% lower and upper bounds reported

- (1) irfname = order1, impulse = rspot, and response = rfuture
- (2) irfname = order1, impulse = rfuture, and response = rfuture

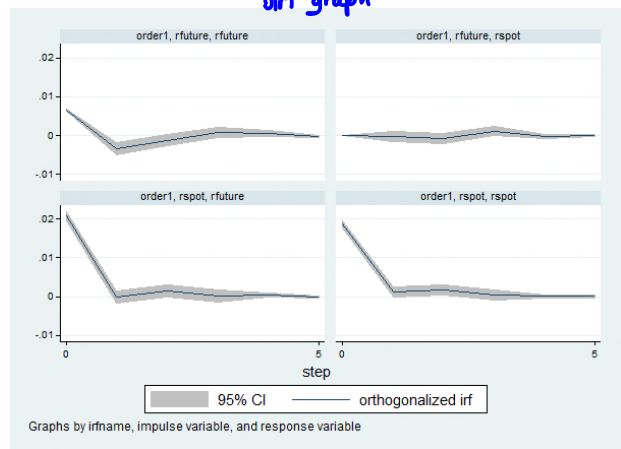
2) rspot have more impact than rfuture since impulse of rspot both significance.

```
. log close
   name: <unnamed>
   log: C:\Users\User\Desktop\EE 426 stata\assignment 15.log
   log type: text
   closed on: 13 May 2021, 12:22:25
```

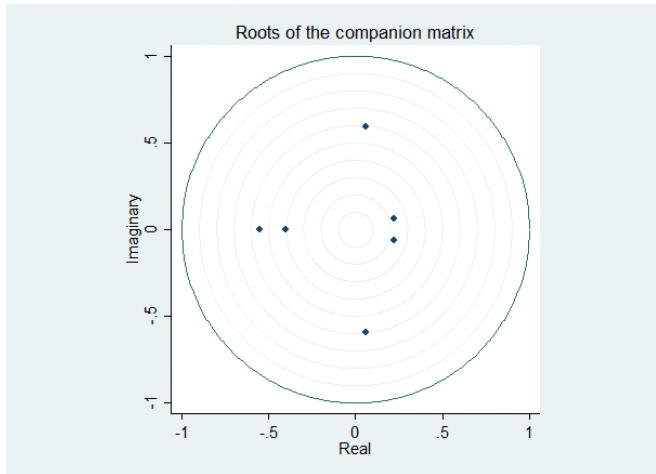
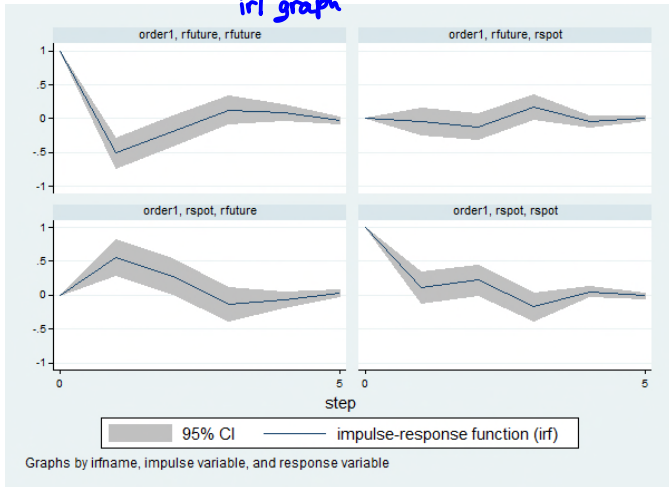
coirf graph



oirf graph



irf graph



Stability

2) The order is necessary, the change of order will lead to the change in solution except for irf. The change in order will change Choleski factorization accordingly.