



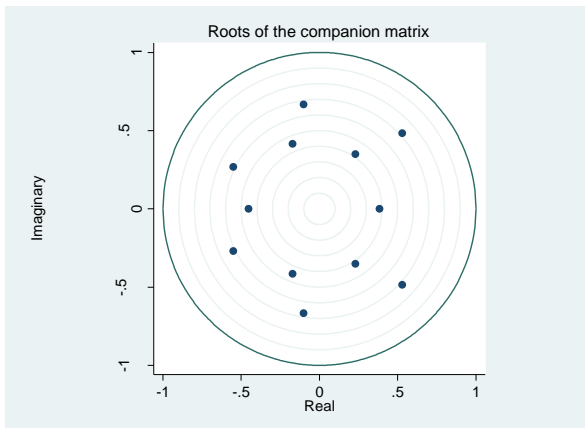
1. If we use the SBIC method to identify which lag order is the best fit data, the order 6 lag is lowest value (-20.0488) and the most appropriate lag model.

```
. varstable, graph
```

Eigenvalue stability condition

Eigenvalue	Modulus
.5279554 + .4847924i	.716771
.5279554 - .4847924i	.716771
-.1022778 + .6675194i	.67531
-.1022778 - .6675194i	.67531
-.5513603 + .2689237i	.613448
-.5513603 - .2689237i	.613448
-.4536067	.453607
-.1726167 + .4151256i	.449584
-.1726167 - .4151256i	.449584
.2305361 + .3500458i	.419141
.2305361 - .3500458i	.419141
.3837855	.383786

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



2. Unit circle can identify the stability of the model, if the eigen value is less than 1. Thus, from the test all the eigen values are less than 1. Then VAR satisfies stability condition.

For Granger test, the  $\text{prob} > \chi^2$  and all  $p\text{-value} < 0.05$ . Hypothesis is rejected. So  $\text{rspt}$  and  $\text{rfuture}$  are endogeneity variables.

. vargranger

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
rspot	rfuture	82.299	6	0.000
rspot	ALL	82.299	6	0.000
rfuture	rspot	148.42	6	0.000
rfuture	ALL	148.42	6	0.000

```
. irf create order1, order(rspot rfuture) step(8) set(irf01)
(file irf01.irf created)
(file irf01.irf now active)
(file irf01.irf updated)
```

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

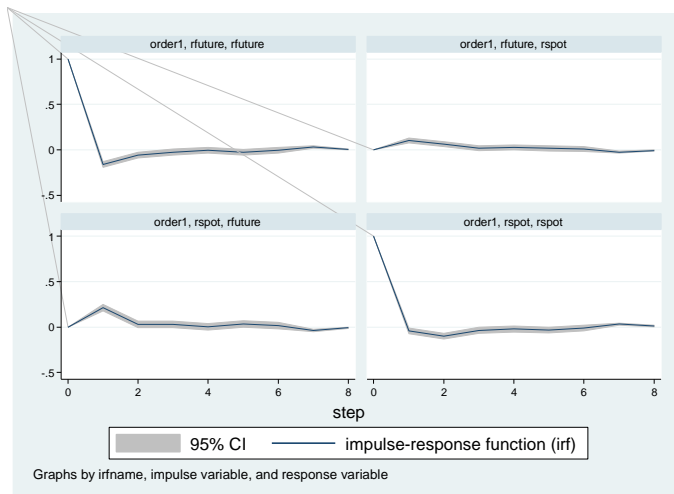
Results from order1

step	(1)			(2)		
	irf	Lower	Upper	irf	Lower	Upper
0	1	1	1	0	0	0
1	-.042989	-.074543	-.011434	.211774	.175513	.248035
2	-.101957	-.133505	-.070409	.030833	-.00561	.067276
3	-.034997	-.066566	-.003428	.030738	-.005677	.067153
4	-.02148	-.052956	.009995	.002714	-.033596	.039023
5	-.033647	-.06485	-.002443	.034962	-.001046	.070971
6	-.010717	-.041519	.020085	.017646	-.017933	.053226
7	.032265	.020916	.043615	-.03579	-.049542	-.022038
8	.012189	.004402	.019975	-.007864	-.015341	-.000387

step	(3)			(4)		
	irf	Lower	Upper	irf	Lower	Upper
0	0	0	0	1	1	1
1	.102511	.075055	.129966	-.162359	-.19391	-.130809
2	.061675	.034224	.089126	-.057352	-.089063	-.025641
3	.018216	-.009265	.045697	-.025324	-.057023	.006376
4	.026291	-.001106	.053688	-.004062	-.035665	.027541
5	.01553	-.011653	.042713	-.029332	-.060699	.002035
6	.006933	-.01982	.033686	-.003566	-.034475	.027344
7	-.026277	-.036538	-.016016	.03073	.017939	.043521
8	-.008158	-.014491	-.001824	.003756	-.002191	.009704

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



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

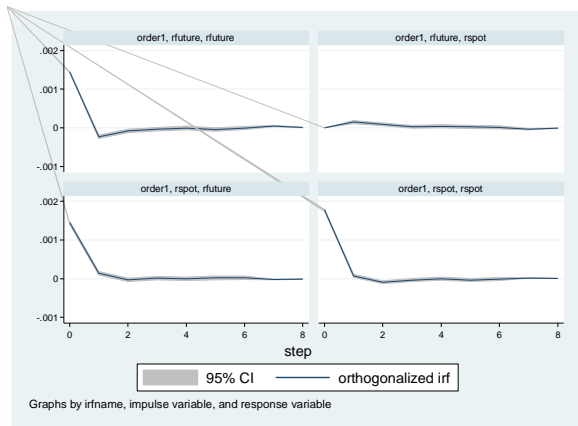
Results from order1

step	(1) oirf	(1) Lower	(1) Upper	(2) oirf	(2) Lower	(2) Upper
0	.001775	.001747	.001803	.001444	.001404	.001483
1	.000072	.000032	.000112	.000142	.000096	.000188
2	-.000092	-.000132	-.000052	-.000028	-.000074	.000018
3	-.000036	-.000076	4.1e-06	.000018	-.000028	.000064
4	-1.8e-07	-.00004	.00004	-1.0e-06	-.000047	.000045
5	-.000037	-.000077	2.5e-06	.00002	-.000026	.000066
6	-9.0e-06	-.000049	.000031	.000026	-.00002	.000072
7	.000019	.000011	.000028	-.000019	-.000028	-1.0e-05
8	9.9e-06	3.6e-06	.000016	-8.5e-06	-.000015	-2.5e-06

step	(3) oirf	(3) Lower	(3) Upper	(4) oirf	(4) Lower	(4) Upper
0	0	0	0	.001441	.001419	.001464
1	.000148	.000108	.000187	-.000234	-.00028	-.000188
2	.000089	.000049	.000128	-.000083	-.000128	-.000037
3	.000026	-.000013	.000066	-.000037	-.000082	9.2e-06
4	.000038	-1.6e-06	.000077	-5.9e-06	-.000051	.00004
5	.000022	-.000017	.000062	-.000042	-.000087	2.9e-06
6	1.0e-05	-.000029	.000049	-5.1e-06	-.00005	.000039
7	-.000038	-.000053	-.000023	.000044	.000026	.000063
8	-.000012	-.000021	-2.6e-06	5.4e-06	-3.2e-06	.000014

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 table coirf, impulse(rspot rfuture) response(rspot rfuture)
```

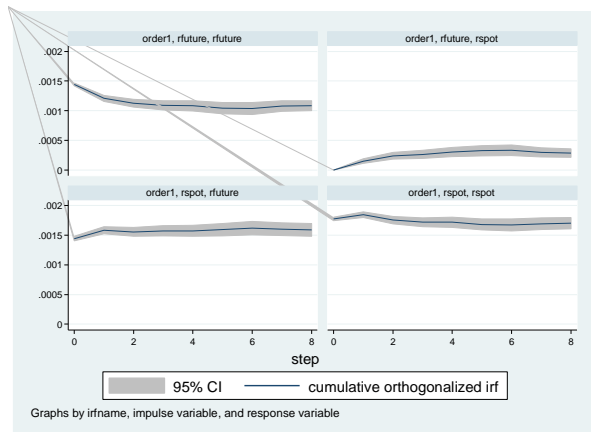
Results from order1

step	(1)			(2)		
	coirf	Lower	Upper	coirf	Lower	Upper
0	.001775	.001747	.001803	.001444	.001404	.001483
1	.001847	.001798	.001896	.001585	.001527	.001644
2	.001755	.001691	.001819	.001557	.001484	.00163
3	.001719	.001644	.001794	.001575	.001491	.001659
4	.001719	.001635	.001803	.001574	.00148	.001668
5	.001682	.001589	.001774	.001594	.001491	.001697
6	.001673	.001573	.001772	.00162	.001509	.001731
7	.001692	.001594	.00179	.001601	.001492	.00171
8	.001702	.001606	.001797	.001592	.001485	.001699

step	(3)			(4)		
	coirf	Lower	Upper	coirf	Lower	Upper
0	0	0	0	.001441	.001419	.001464
1	.000148	.000108	.000187	.001207	.001158	.001257
2	.000237	.00018	.000294	.001125	.001059	.00119
3	.000263	.000194	.000332	.001088	.00101	.001166
4	.000301	.000223	.000379	.001082	.000995	.00117
5	.000323	.000238	.000409	.00104	.000945	.001136
6	.000333	.000242	.000424	.001035	.000934	.001136
7	.000295	.000216	.000374	.001079	.000991	.001167
8	.000284	.00021	.000357	.001085	.001001	.001168

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



### 3. Direction : All variables have positive direction

Magnitude: rspot on rfuture is larger than rfuture on rspot And rfuture on rfuture have impact more than rspot on rspot.

Duration: there are 6 period for getting to stable or zero.

```
. 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	.993131	.989465	.996798	.006869	.003202	.010535
3	.990693	.98638	.995006	.009307	.004994	.01362
4	.990483	.986145	.994821	.009517	.005179	.013855
5	.990038	.98565	.994426	.009962	.005574	.01435
6	.989888	.985487	.994289	.010112	.005711	.014513
7	.989857	.985466	.994248	.010143	.005752	.014534
8	.989415	.984856	.993973	.010585	.006027	.015144

95% lower and upper bounds reported

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

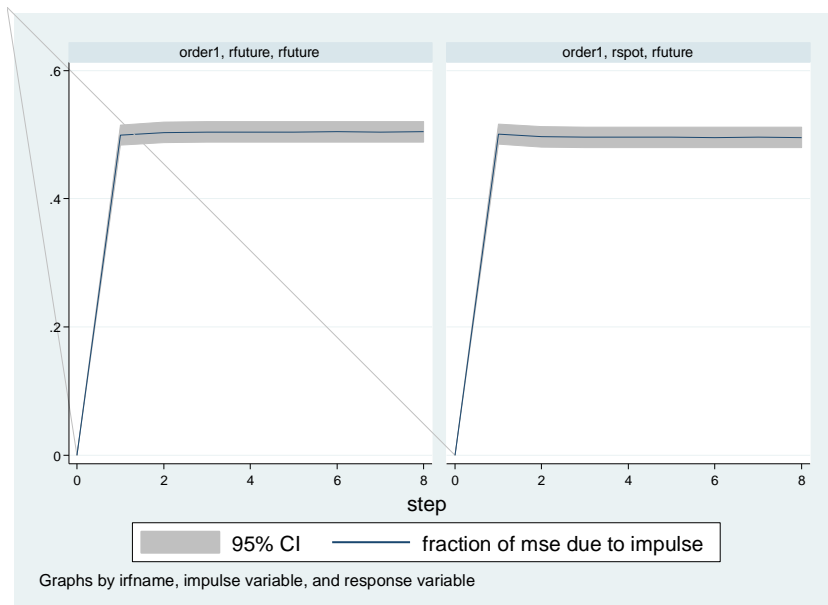
```
. irf table fevd, impulse(rspot rfuture) response(rfuture)
```

Results from order1

step	(1) fevd	(1) Lower	(1) Upper	(2) fevd	(2) Lower	(2) Upper
0	0	0	0	0	0	0
1	.500791	.484986	.516596	.499209	.483404	.515014
2	.496679	.480799	.512558	.503321	.487442	.519201
3	.495972	.480066	.511879	.504028	.488121	.519934
4	.495855	.479951	.51176	.504145	.48824	.520049
5	.495851	.479947	.511756	.504149	.488244	.520053
6	.495689	.479783	.511594	.504311	.488406	.520217
7	.495767	.479862	.511672	.504233	.488328	.520138
8	.495582	.479675	.511488	.504418	.488512	.520325

95% lower and upper bounds reported

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



First all variables are significant since it value doesn't cover zero in lower and upper bound. Rspot cause the impact on rspot more than on rfuture due to higher value. And Rfuture cause itself than the rspot.

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