```
1 . varbasic VanadiumPrice VanadiumProduction  REA1, lags(1/2) step(8) irf
```

Vector autoregression

Sample:	**1970 - 2019**	Number of obs	=	**50**
Log likelihood	= **84.04813**	AIC	=	**-2.521925**
FPE	= **.0000162**	HQIC	=	**-2.216119**
Det(Sigma_ml)	= **6.96e-06**	SBIC	=	**-1.718875**

Equation	Parms	RMSE	R-sq	chi2	P>chi2
VanadiumPrice	**7**	**.180665**	**0.1897**	**11.70639**	**0.0688**
VanadiumProduc~n	**7**	**.053999**	**0.0538**	**2.841185**	**0.8285**
REA1	**7**	**.368186**	**0.5150**	**53.08636**	**0.0000**

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
VanadiumPrice						
VanadiumPrice						
L1.	**-.0870717**	**.1370181**	**-0.64**	**0.525**	**-.3556223**	**.1814789**
L2.	**-.0395604**	**.1422833**	**-0.28**	**0.781**	**-.3184305**	**.2393097**
VanadiumProduction						
L1.	**-.1397534**	**.4960095**	**-0.28**	**0.778**	**-1.111914**	**.8324073**
L2.	**.1537236**	**.5019498**	**0.31**	**0.759**	**-.83008**	**1.137527**
REA1						
L1.	**.1818439**	**.0666095**	**2.73**	**0.006**	**.0512917**	**.312396**
L2.	**-.2069445**	**.0668446**	**-3.10**	**0.002**	**-.3379576**	**-.0759314**
_cons	**.0205741**	**.0270157**	**0.76**	**0.446**	**-.0323757**	**.0735239**
VanadiumProduction						
VanadiumPrice						
L1.	**-.0109584**	**.0409533**	**-0.27**	**0.789**	**-.0912255**	**.0693086**
L2.	**-.0274083**	**.042527**	**-0.64**	**0.519**	**-.1107598**	**.0559432**
VanadiumProduction						
L1.	**-.1524282**	**.1482522**	**-1.03**	**0.304**	**-.4429972**	**.1381409**
L2.	**.1303844**	**.1500277**	**0.87**	**0.385**	**-.1636645**	**.4244334**
REA1						
L1.	**.0144648**	**.0199089**	**0.73**	**0.468**	**-.0245559**	**.0534855**
L2.	**-.0147656**	**.0199792**	**-0.74**	**0.460**	**-.0539241**	**.0243928**
_cons	**.0193673**	**.0080747**	**2.40**	**0.016**	**.0035411**	**.0351934**
REA1						
VanadiumPrice						
L1.	**-.1267078**	**.2792353**	**-0.45**	**0.650**	**-.673999**	**.4205834**
L2.	**.5795115**	**.2899654**	**2.00**	**0.046**	**.0111897**	**1.147833**
VanadiumProduction						
L1.	**-1.808436**	**1.01084**	**-1.79**	**0.074**	**-3.789646**	**.1727734**
L2.	**-.1401569**	**1.022946**	**-0.14**	**0.891**	**-2.145094**	**1.86478**
REA1						
L1.	**.8502516**	**.1357464**	**6.26**	**0.000**	**.5841936**	**1.11631**
L2.	**-.2675444**	**.1362256**	**-1.96**	**0.050**	**-.5345417**	**-.000547**
_cons	**.0283389**	**.0550565**	**0.51**	**0.607**	**-.0795698**	**.1362476**

```
2 . varstable
```

Eigenvalue stability condition

Eigenvalue	Modulus
.5912314 + .3261711*i*	.675235
.5912314 - .3261711*i*	.675235
-.197975 + .5003265*i*	.538071
-.197975 - .5003265*i*	.538071
-.4236271	.423627
.247866	.247866

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

```
3 . predict error11, resid
(5 missing values generated)

4 . summarize error11
```

Variable	Obs	Mean	Std. Dev.	Min	Max
error11	50	-4.42e-10	.169243	-.3790916	.3782963

```
5 . tsline error11, yline(-4.42e-10 )

6 . varlmar
```

Lagrange-multiplier test

lag	chi2	df	Prob > chi2
1	17.8585	9	0.03685
2	12.5871	9	0.18220

H0: no autocorrelation at lag order

```
7 . vargranger
```

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
VanadiumPrice	VanadiumProduct~n	.20486	2	0.903
VanadiumPrice	REA1	10.391	2	0.006
VanadiumPrice	ALL	10.609	4	0.031
VanadiumProduct~n	VanadiumPrice	.46706	2	0.792
VanadiumProduct~n	REA1	.64515	2	0.724
VanadiumProduct~n	ALL	1.2385	4	0.872
REA1	VanadiumPrice	4.3318	2	0.115
REA1	VanadiumProduct~n	3.2209	2	0.200
REA1	ALL	9.0186	4	0.061

```
8 . irf table fevd, impulse( VanadiumPrice VanadiumProduction REA1 ) response( VanadiumPrice VanadiumProdu
> 1 ) noci
```

Results from varbasic

step	(1) fevd	(2) fevd	(3) fevd	(4) fevd	(5) fevd	(6) fevd	(7) fevd	(8) fevd
0	0	0	0	0	0	0	0	0
1	1	.114571	.005648	0	.885429	.036698	0	0
2	.883537	.117424	.007848	.000882	.873544	.025893	.11558	.009032
3	.865914	.117786	.029579	.00473	.871443	.029679	.129356	.010771
4	.839299	.118401	.0477	.004621	.868185	.031918	.15608	.013414
5	.836729	.11839	.050115	.005145	.868176	.033156	.158126	.013433
6	.834693	.118618	.05115	.005227	.867944	.033671	.16008	.013439
7	.833305	.118621	.051249	.005294	.867924	.033602	.161401	.013456
8	.833247	.118618	.051196	.005378	.867905	.033546	.161375	.013477

step	(9) fevd
0	**0**
1	**.957654**
2	**.96626**
3	**.940742**
4	**.920382**
5	**.916729**
6	**.91518**
7	**.915149**
8	**.915258**

(1) irfname = varbasic, impulse = VanadiumPrice, and response = VanadiumPrice
(2) irfname = varbasic, impulse = VanadiumPrice, and response = VanadiumProduction
(3) irfname = varbasic, impulse = VanadiumPrice, and response = REA1
(4) irfname = varbasic, impulse = VanadiumProduction, and response = VanadiumPrice
(5) irfname = varbasic, impulse = VanadiumProduction, and response = VanadiumProduction
(6) irfname = varbasic, impulse = VanadiumProduction, and response = REA1
(7) irfname = varbasic, impulse = REA1, and response = VanadiumPrice
(8) irfname = varbasic, impulse = REA1, and response = VanadiumProduction
(9) irfname = varbasic, impulse = REA1, and response = REA1

```
9 .
```