```
                                              ___   ___   ___   ___   ___(R)
                                             /__    /    ___/   /    ___/
                                            ___/   /   /___/   /   /___/
                                             Statistics/Data analysis

                                               User: Sreeram
                                               Project: Econometrics
```

1293.	**193.5959**	136.2
1294.	0	0
1295.	0	0
1296.	**193.5959**	136.2
1297.	**193.5959**	136.2
1298.	0	0
1299.	**193.5959**	136.2
1300.	**193.5959**	136.2
1301.	**193.5959**	136.2
1302.	**193.5959**	136.2
1303.	0	0
1304.	**193.5959**	136.2
1305.	0	0
1306.	**193.5959**	136.2
1307.	.	.
1308.	.	.
1309.	.	.
1310.	.	.
1311.	.	.
1312.	.	.
1313.	.	.
1314.	.	.
1315.	.	.
1316.	.	.
1317.	.	.
1318.	.	.
1319.	.	.
1320.	.	.
1321.	.	.
1322.	.	.
1323.	.	.
1324.	.	.
1325.	.	.

```
1 .
  end of do-file

2 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

3 . ****Perfroming DF Test****
4 . dfuller DTWEXBGS, drift regress lags(8)

  Augmented Dickey–Fuller test for unit root

  Variable: DTWEXBGS                        Number of obs  = 799
                                            Number of lags =   8

  H0: Random walk with drift, d = 0
```

	Test statistic	t-distribution critical value		
		1%	5%	10%
Z(t)	**-1.182**	**-2.331**	**-1.647**	**-1.283**

p-value for Z(t) = **0.1188**

Regression table

D.DTWEXBGS	Coefficient	Std. err.	t	P>|t|	[95% conf. interval]	
DTWEXBGS						
L1.	-.0043562	.0036854	-1.18	0.238	-.0115905	.0028781
LD.	.0995662	.03567	2.79	0.005	.029547	.1695855
L2D.	.0011351	.0357451	0.03	0.975	-.0690316	.0713018
L3D.	.0365514	.0354279	1.03	0.303	-.0329928	.1060955
L4D.	-.0031342	.0354464	-0.09	0.930	-.0727145	.0664462
L5D.	.0022888	.0354714	0.06	0.949	-.0673407	.0719183
L6D.	-.1297256	.0356575	-3.64	0.000	-.1997205	-.0597308
L7D.	.0158639	.0358652	0.44	0.658	-.0545385	.0862664
L8D.	.0635655	.0358352	1.77	0.076	-.0067781	.1339092
_cons	.5247229	.4344524	1.21	0.227	-.3280965	1.377542

5 .
  end of do-file

6 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

7 . *We see the lag 6 is significant. We remove the rest of the lags*
8 . dfuller DTWEXBGS, drift regress lags(6)

Augmented Dickey–Fuller test for unit root

Variable: **DTWEXBGS**   Number of obs = **893**
                                              Number of lags =   **6**

H0: Random walk with drift, d = 0

	Test statistic	t-distribution critical value		
		1%	5%	10%
Z(t)	**-1.658**	**-2.331**	**-1.647**	**-1.283**

p-value for Z(t) = **0.0489**

Regression table

D.DTWEXBGS	Coefficient	Std. err.	t	P>|t|	[95% conf. interval]	
DTWEXBGS						
L1.	-.0056665	.0034187	-1.66	0.098	-.0123762	.0010432
LD.	.0948427	.033686	2.82	0.005	.028729	.1609564
L2D.	-.001892	.0336567	-0.06	0.955	-.0679483	.0641643
L3D.	.0481348	.033297	1.45	0.149	-.0172155	.1134851
L4D.	.0030221	.0331801	0.09	0.927	-.0620988	.0681429
L5D.	-.0075872	.0332525	-0.23	0.820	-.0728502	.0576759
L6D.	-.0975565	.0334988	-2.91	0.004	-.1633028	-.0318102
_cons	.6826667	.4030394	1.69	0.091	-.1083578	1.473691

9 . *From the test statistic, we fail to reject the null (stationary)*
10 .
  end of do-file

11 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

12 . **DF Test of Crude Oil**
13 . dfuller CRUDEOIL, drift regress lags(8)

Augmented Dickey–Fuller test for unit root

Variable: **CRUDEOIL**   Number of obs = **1,027**
                                               Number of lags =   **8**

H0: Random walk with drift, d = 0

	Test statistic	t-distribution critical value		
		1%	5%	10%
Z(t)	**-1.058**	**-2.330**	**-1.646**	**-1.282**

p-value for Z(t) = **0.1451**

Regression table

D.CRUDEOIL	Coefficient	Std. err.	t	P>|t|	[95% conf. interval]	
CRUDEOIL						
L1.	-.0031138	.0029428	-1.06	0.290	-.0088884	.0026608
LD.	.0427761	.0314273	1.36	0.174	-.0188936	.1044459
L2D.	-.0406697	.031615	-1.29	0.199	-.1027078	.0213683
L3D.	-.0237448	.0313844	-0.76	0.449	-.0853304	.0378409
L4D.	.044148	.0312845	1.41	0.158	-.0172417	.1055376
L5D.	-.0685718	.0311721	-2.20	0.028	-.1297408	-.0074028
L6D.	-.1076925	.0311046	-3.46	0.001	-.1687291	-.046656
L7D.	.0346885	.0314086	1.10	0.270	-.0269446	.0963216
L8D.	-.0110371	.031295	-0.35	0.724	-.0724472	.050373
_cons	.2338982	.2235884	1.05	0.296	-.2048491	.6726455

14 .
   end of do-file

15 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

16 . *Lag 5 significant*
17 . dfuller CRUDEOIL, drift regress lags(5)

Augmented Dickey–Fuller test for unit root

Variable: **CRUDEOIL**   Number of obs = **1,102**
                                               Number of lags =   **5**

H0: Random walk with drift, d = 0

	Test statistic	t-distribution critical value		
		1%	5%	10%
Z(t)	**-1.286**	**-2.330**	**-1.646**	**-1.282**

p-value for Z(t) = **0.0993**

Regression table

D.CRUDEOIL	Coefficient	Std. err.	t	P>|t|	[95% conf. interval]	
CRUDEOIL						
L1.	-.0035904	.0027909	-1.29	0.199	-.0090665	.0018857
LD.	.0373932	.0299593	1.25	0.212	-.021391	.0961773
L2D.	-.0499411	.029721	-1.68	0.093	-.1082577	.0083756
L3D.	-.025024	.0297626	-0.84	0.401	-.0834222	.0333741
L4D.	.0450802	.0299507	1.51	0.133	-.0136871	.1038474
L5D.	-.0671877	.0299979	-2.24	0.025	-.1260476	-.0083277
_cons	.304637	.2120356	1.44	0.151	-.111405	.7206791

18 .
   end of do-file

19 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

20 . **DF test of Gold Votality*
21 . dfuller GOLDETF, drift regress lags(8)

   Augmented Dickey–Fuller test for unit root

   Variable: **GOLDETF**   Number of obs = **877**
                                                  Number of lags =   **8**

   H0: Random walk with drift, d = 0

	Test	t-distribution critical value		
	statistic	1%	5%	10%
Z(t)	**-3.762**	**-2.331**	**-1.647**	**-1.283**

   p-value for Z(t) = **0.0001**

   Regression table

D.GOLDETF	Coefficient	Std. err.	t	P>|t|	[95% conf. interval]	
GOLDETF						
L1.	-.0316134	.0084038	-3.76	0.000	-.0481075	-.0151193
LD.	-.0156566	.0336748	-0.46	0.642	-.0817502	.0504371
L2D.	.0112685	.0338164	0.33	0.739	-.055103	.07764
L3D.	-.1069916	.0339587	-3.15	0.002	-.1736426	-.0403406
L4D.	.0406543	.0341983	1.19	0.235	-.0264669	.1077754
L5D.	-.000211	.0342435	-0.01	0.995	-.0674209	.066999
L6D.	.0311456	.0340089	0.92	0.360	-.0356038	.097895
L7D.	.0905779	.0339085	2.67	0.008	.0240255	.1571304
L8D.	-.0034192	.0341017	-0.10	0.920	-.0703508	.0635125
_cons	.5225144	.1497807	3.49	0.001	.2285393	.8164894

22 .
   end of do-file

23 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

24 . dfuller GOLDETF, drift regress lags(3)

   Augmented Dickey–Fuller test for unit root

   Variable: **GOLDETF**   Number of obs = **1,082**
                                                  Number of lags =   **3**

   H0: Random walk with drift, d = 0

	Test	t-distribution critical value		
	statistic	1%	5%	10%
Z(t)	**-3.153**	**-2.330**	**-1.646**	**-1.282**

   p-value for Z(t) = **0.0008**

Regression table

D.GOLDETF	Coefficient	Std. err.	t	P>|t|	[95% conf. interval]	
GOLDETF						
L1.	-.0227552	.0072176	-3.15	0.002	-.0369174	-.008593
LD.	-.017395	.0304777	-0.57	0.568	-.0771975	.0424074
L2D.	-.0012859	.0307302	-0.04	0.967	-.0615838	.059012
L3D.	-.0900814	.0308569	-2.92	0.004	-.1506278	-.029535
_cons	.3876071	.1271752	3.05	0.002	.1380679	.6371464

25 .
   end of do-file

26 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

27 . *DF Test differenced for all*
28 . dfuller d.DTWEXBGS, noconstant regress lags(8)

   Augmented Dickey–Fuller test for unit root

   Variable: **D.DTWEXBGS**   Number of obs = **757**
                                               Number of lags =   **8**

   H0: Random walk without drift, a = 0, d = 0

	Test statistic	Dickey–Fuller critical value 1%	5%	10%
Z(t)	**-8.713**	**-2.580**	**-1.950**	**-1.620**

   Regression table

D2.DTWEXBGS	Coefficient	Std. err.	t	P>|t|	[95% conf. interval]	
DTWEXBGS						
LD.	-.8825755	.1012926	-8.71	0.000	-1.081427	-.6837239
LD2.	-.0263813	.0951645	-0.28	0.782	-.2132026	.16044
L2D2.	-.0195774	.0885118	-0.22	0.825	-.1933384	.1541837
L3D2.	.0249943	.0814712	0.31	0.759	-.1349451	.1849337
L4D2.	.0080247	.0753276	0.11	0.915	-.139854	.1559034
L5D2.	.0194509	.0680536	0.29	0.775	-.1141479	.1530497
L6D2.	-.1203785	.0604918	-1.99	0.047	-.2391324	-.0016246
L7D2.	-.0958952	.0500717	-1.92	0.056	-.194193	.0024025
L8D2.	-.0339561	.0364063	-0.93	0.351	-.1054268	.0375145

29 .
   end of do-file

30 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

31 . *Lag 6 significant*
32 . dfuller d.DTWEXBGS, noconstant regress lags(6)

   Augmented Dickey–Fuller test for unit root

   Variable: **D.DTWEXBGS**   Number of obs = **845**
                                               Number of lags =   **6**

   H0: Random walk without drift, a = 0, d = 0

	Test statistic	Dickey–Fuller critical value 1%	5%	10%
Z(t)	**-11.410**	**-2.580**	**-1.950**	**-1.620**

Regression table

D2.DTWEXBGS	Coefficient	Std. err.	t	P>|t|	[95% conf. interval]	
DTWEXBGS						
LD.	-.9644797	.0845257	-11.41	0.000	-1.130387	-.7985728
LD2.	.0640279	.077163	0.83	0.407	-.0874276	.2154833
L2D2.	.0602454	.0712605	0.85	0.398	-.0796245	.2001154
L3D2.	.0984781	.0649328	1.52	0.130	-.028972	.2259282
L4D2.	.1017913	.0580758	1.75	0.080	-.0121998	.2157823
L5D2.	.0946062	.047971	1.97	0.049	.0004488	.1887636
L6D2.	-.0166786	.034955	-0.48	0.633	-.0852882	.0519311

33 .
   end of do-file

34 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

35 . **DF Test of Crude Oil**
36 . dfuller d.CRUDEOIL, noconstant regress lags(8)

   Augmented Dickey-Fuller test for unit root

   Variable: **D.CRUDEOIL**   Number of obs = **1,003**
                                               Number of lags =   **8**

   H0: Random walk without drift, a = 0, d = 0

	Test statistic	Dickey-Fuller critical value 1%	5%	10%
Z(t)	**-11.187**	**-2.580**	**-1.950**	**-1.620**

   Regression table

D2.CRUDEOIL	Coefficient	Std. err.	t	P>|t|	[95% conf. interval]	
CRUDEOIL						
LD.	-1.120743	.1001822	-11.19	0.000	-1.317336	-.9241499
LD2.	.1599452	.093612	1.71	0.088	-.0237546	.3436449
L2D2.	.1166848	.0867445	1.35	0.179	-.0535385	.2869081
L3D2.	.0904841	.0785977	1.15	0.250	-.0637524	.2447206
L4D2.	.1357627	.0709799	1.91	0.056	-.003525	.2750504
L5D2.	.0711461	.0636704	1.12	0.264	-.0537977	.19609
L6D2.	-.0396996	.0543427	-0.73	0.465	-.1463391	.0669399
L7D2.	-.0001281	.0441822	-0.00	0.998	-.0868292	.0865731
L8D2.	-.0185902	.0316634	-0.59	0.557	-.0807249	.0435445

37 .
   end of do-file

38 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

39 . *Lag 4 significant*
40 . dfuller d.CRUDEOIL, noconstant regress lags(4)

   Augmented Dickey-Fuller test for unit root

   Variable: **D.CRUDEOIL**   Number of obs = **1,102**
                                               Number of lags =   **4**

   H0: Random walk without drift, a = 0, d = 0

	Test statistic	Dickey-Fuller critical value 1%	5%	10%
Z(t)	**-15.944**	**-2.580**	**-1.950**	**-1.620**

Regression table

D2.CRUDEOIL	Coefficient	Std. err.	t	P>|t|	[95% conf. interval]	
CRUDEOIL						
LD.	-1.067481	.0669537	-15.94	0.000	-1.198853	-.9361095
LD2.	.1033145	.0600811	1.72	0.086	-.0145723	.2212013
L2D2.	.0518864	.0512922	1.01	0.312	-.0487554	.1525283
L3D2.	.0254024	.041381	0.61	0.539	-.0557925	.1065973
L4D2.	.069224	.0299663	2.31	0.021	.0104262	.1280218

41 .
   end of do-file

42 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

43 . dfuller d.GOLDETF, noconstant regress lags(8)

   Augmented Dickey–Fuller test for unit root

   Variable: **D.GOLDETF**   Number of obs = **839**
                                                        Number of lags =   **8**

   H0: Random walk without drift, a = 0, d = 0

	Test statistic	Dickey–Fuller critical value 1%	5%	10%
Z(t)	**-10.751**	**-2.580**	**-1.950**	**-1.620**

Regression table

D2.GOLDETF	Coefficient	Std. err.	t	P>|t|	[95% conf. interval]	
GOLDETF						
LD.	-1.181173	.1098712	-10.75	0.000	-1.396831	-.9655149
LD2.	.1360194	.1032341	1.32	0.188	-.0666113	.3386501
L2D2.	.1283573	.0968469	1.33	0.185	-.0617364	.3184511
L3D2.	.0047451	.0893999	0.05	0.958	-.1707313	.1802215
L4D2.	.0248274	.0811946	0.31	0.760	-.1345435	.1841984
L5D2.	.0063158	.0720434	0.09	0.930	-.1350929	.1477245
L6D2.	.0208768	.0603784	0.35	0.730	-.0976354	.1393891
L7D2.	.097558	.0493646	1.98	0.048	.0006638	.1944521
L8D2.	.0829781	.034612	2.40	0.017	.0150407	.1509154

44 .
   end of do-file

45 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

46 . dfuller d.GOLDETF, noconstant regress lags(3)

   Augmented Dickey–Fuller test for unit root

   Variable: **D.GOLDETF**   Number of obs = **1,041**
                                                        Number of lags =   **3**

   H0: Random walk without drift, a = 0, d = 0

	Test statistic	Dickey–Fuller critical value 1%	5%	10%
Z(t)	**-17.092**	**-2.580**	**-1.950**	**-1.620**

Regression table

D2.GOLDETF	Coefficient	Std. err.	t	P>|t|	[95% conf. interval]	
GOLDETF						
LD.	-1.127227	.0659496	-17.09	0.000	-1.256637	-.997817
LD2.	.0972141	.0555701	1.75	0.081	-.0118285	.2062568
L2D2.	.0842781	.045112	1.87	0.062	-.0042431	.1727992
L3D2.	-.0208594	.031545	-0.66	0.509	-.0827587	.04104

47 .
   end of do-file

48 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

49 . *ARMA(1,1)*
50 . arima d.DTWEXBGS, arima (1,0,1), if t<1045

   Number of gaps in sample = **41**
   (note: filtering over missing observations)

   (setting optimization to BHHH)
   Iteration 0: Log likelihood = **-475.32144**
   Iteration 1: Log likelihood = **-464.45013**
   Iteration 2: Log likelihood = **-462.56631**
   Iteration 3: Log likelihood = **-462.0718**
   Iteration 4: Log likelihood = **-462.03264**
   (switching optimization to BFGS)
   Iteration 5: Log likelihood = **-462.02332**
   Iteration 6: Log likelihood = **-462.01972**
   Iteration 7: Log likelihood = **-462.01968**

   ARIMA regression

   Sample: **2** thru **1044**, but with gaps   Number of obs   =   **956**
                                                       Wald chi2(**2**)   =   **17.82**
   Log likelihood = **-462.0197**   Prob > chi2   =   **0.0001**

D.DTWEXBGS	Coefficient	OPG std. err.	z	P>|z|	[95% conf. interval]	
DTWEXBGS						
_cons	.0038914	.0146561	0.27	0.791	-.0248339	.0326167
ARMA						
ar						
L1.	.4407524	.2390975	1.84	0.065	-.02787	.9093748
ma						
L1.	-.366068	.2504663	-1.46	0.144	-.856973	.124837
/sigma	.392259	.005835	67.23	0.000	.3808227	.4036953

   Note: The test of the variance against zero is one sided, and the two-sided
         confidence interval is truncated at zero.

51 .
   end of do-file

52 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

53 . wntestq r
   (note: time series has 52 gaps)

   Portmanteau test for white noise
   ─────────────────────────────────
    Portmanteau (Q) statistic =   47.6964
    Prob > chi2(40)   =   0.1883

54 .
   end of do-file

55 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

56 . display "adj p-valu = " chi2tail(r(df)-2,r(stat))
   adj p-valu = .13464521

57 .
   end of do-file

58 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

59 . estat aroots

      Eigenvalue stability condition

Eigenvalue	Modulus
.4407524	.440752

   All the eigenvalues lie inside the unit circle.
   AR parameters satisfy stability condition.

      Eigenvalue stability condition

Eigenvalue	Modulus
.366068	.366068

   All the eigenvalues lie inside the unit circle.
   MA parameters satisfy invertibility condition.

60 .
   end of do-file

61 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

62 . estat ic

   Akaike's information criterion and Bayesian information criterion

Model	N	ll(null)	ll(model)	df	AIC	BIC
.	956	.	-462.0197	4	932.0394	951.4904

   Note: BIC uses N = number of observations. See [R] IC note.

63 . predict r, r
   variable r already defined
   r(110);

   end of do-file

   r(110);

64 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

65 . matrix absroots = r(Modulus_ar)

66 .
   end of do-file

67 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

68 . mata:
   ─────────────────────────────────── mata (type **end** to exit) ───────
   :   absroots = st_matrix("absroots")

   :   highestroot = max(absroots)

   :   st_numscalar("highestroot", highestroot)

   : end
   ──

69 . display "The highest absolute value of the AR root is: " highestroot
   The highest absolute value of the AR root is: .

70 .
   end of do-file

71 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

72 . display "adj p-valu = " chi2tail(r(df)-2,r(stat))
   adj p-valu = .

73 .
   end of do-file

74 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

75 . predict r, r
   variable r already defined
   r(110);

   end of do-file

   r(110);

76 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

77 . wntestq r
   (note: time series has 52 gaps)

   Portmanteau test for white noise
   ──
    Portmanteau (Q) statistic =   **47.6964**
    Prob > chi2(**40**)   =   **0.1883**

78 .
   end of do-file

79 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

80 . estat ic

   Akaike's information criterion and Bayesian information criterion

Model	N	ll(null)	ll(model)	df	AIC	BIC
.	**956**	.	**-462.0197**	**4**	**932.0394**	**951.4904**

   Note: BIC uses N = number of observations. See **[R] IC note**.

81 .
   end of do-file

82 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

83 . predict r, r
   variable r already defined
   r(110);

   end of do-file

   r(110);

84 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

85 . wntestq r
   (note: time series has 52 gaps)

   Portmanteau test for white noise
   ───
    Portmanteau (Q) statistic =   **47.6964**
    Prob > chi2(**40**)   =   **0.1883**

86 .
   end of do-file

87 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

88 . display "adj p-valu = " chi2tail(r(df)-2,r(stat))
   adj p-valu = .13464521

89 .
   end of do-file

90 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

91 . estat aroots

       Eigenvalue stability condition

Eigenvalue	Modulus
.4407524	**.440752**

   All the eigenvalues lie inside the unit circle.
   AR parameters satisfy stability condition.

       Eigenvalue stability condition

Eigenvalue	Modulus
.366068	**.366068**

   All the eigenvalues lie inside the unit circle.
   MA parameters satisfy invertibility condition.

92 .
   end of do-file

93 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

94 . matrix absroots = r(Modulus_ar)

```
95 . mata:
                                        ─────── mata (type end to exit) ───────
    :   absroots = st_matrix("absroots")

    :   highestroot = max(absroots)

    :   st_numscalar("highestroot", highestroot)

    : end
   ─────────────────────────────────────────────────────────────────────────────
```

```
96 . display "The highest absolute value of the AR root is: " highestroot
   The highest absolute value of the AR root is: .44075238
```

```
97 .
   end of do-file
```

```
98 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"
```

```
99 . *ARMA(2,1)*
100 . arima DTWEXBGS, arima (2,0,1), if t<1045

   Number of gaps in sample = 42
   (note: filtering over missing observations)

   (setting optimization to BHHH)
   Iteration 0:  Log likelihood = -679.41046
   Iteration 1:  Log likelihood = -505.75813
   Iteration 2:  Log likelihood = -492.93402
   Iteration 3:  Log likelihood = -492.39069
   Iteration 4:  Log likelihood = -491.71243
   (switching optimization to BFGS)
   Iteration 5:  Log likelihood = -491.54016
   Iteration 6:  Log likelihood = -491.34066
   Iteration 7:  Log likelihood = -491.33287
   Iteration 8:  Log likelihood = -491.33224
   Iteration 9:  Log likelihood = -491.33208
   Iteration 10: Log likelihood = -491.33208

   ARIMA regression
```

Sample: 1 thru 1044, but with gaps

Log likelihood = -491.3321

	Number of obs	=	999
	Wald chi2(3)	=	416234.99
	Prob > chi2	=	0.0000

DTWEXBGS	Coefficient	OPG std. err.	z	P>|z|	[95% conf. interval]	
DTWEXBGS						
_cons	117.4204	2.420287	48.52	0.000	112.6768	122.1641
ARMA						
ar						
L1.	1.49961	.2157635	6.95	0.000	1.076722	1.922499
L2.	-.5026245	.2147409	-2.34	0.019	-.9235089	-.0817401
ma						
L1.	-.4349464	.2289006	-1.90	0.057	-.8835833	.0136906
/sigma	.3882613	.005776	67.22	0.000	.3769405	.3995821

Note: The test of the variance against zero is one sided, and the two-sided
      confidence interval is truncated at zero.

```
101 .
    end of do-file

102 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

103 . wntestq r
    (note: time series has 52 gaps)

    Portmanteau test for white noise
    ──────────────────────────────────────
     Portmanteau (Q) statistic =    47.6964
     Prob > chi2(40)           =     0.1883

104 .
    end of do-file

105 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

106 . ****Computing my loss function****
107 . gen D1AR21 = cond(f21 > DTWEXBGS, 1, 0)
    variable D1AR21 already defined
    r(110);

    end of do-file

    r(110);

108 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

109 . gen D2AR21 = cond(DTWEXBGS[_n+1] > DTWEXBGS, 1, 0)
    variable D2AR21 already defined
    r(110);

    end of do-file

    r(110);

110 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

111 . *Calculating the difference*
112 . gen diff21 = DTWEXBGS[_n+1] - DTWEXBGS
    variable diff21 already defined
    r(110);

    end of do-file

    r(110);

113 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

114 . summarize loss, mean
    loss ambiguous abbreviation
    r(111);

    end of do-file

    r(111);

115 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

116 . summarize loss21, mean
```

```
117 . display "The average loss of ARMA(2,1) is " r(mean)
    The average loss of ARMA(2,1) is 24.35293

118 .
    end of do-file

119 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

120 . display "The average loss of ARMA(2,2) is " r(mean)
    The average loss of ARMA(2,2) is 24.35293

121 .
    end of do-file

122 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

123 . display "The average loss of ARMA(1,1) is " r(mean)
    The average loss of ARMA(1,1) is 24.35293

124 .
    end of do-file

125 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

126 . *ARMA(2,2)*
127 . arima d.DTWEXBGS, arima (2,0,2), if t<1045

    Number of gaps in sample = 41
    (note: filtering over missing observations)

    (setting optimization to BHHH)
    Iteration 0:  Log likelihood = -474.30029
    Iteration 1:  Log likelihood = -469.40361
    Iteration 2:  Log likelihood = -466.72794
    Iteration 3:  Log likelihood = -464.88901
    Iteration 4:  Log likelihood = -463.31856
    (switching optimization to BFGS)
    Iteration 5:  Log likelihood = -461.20671
    Iteration 6:  Log likelihood = -461.20246  (backed up)
    Iteration 7:  Log likelihood = -461.10537
    Iteration 8:  Log likelihood = -460.52011
    Iteration 9:  Log likelihood = -460.32257
    Iteration 10: Log likelihood = -459.75376
    Iteration 11: Log likelihood = -459.65833
    Iteration 12: Log likelihood = -459.61182
    Iteration 13: Log likelihood = -459.60066
    Iteration 14: Log likelihood = -459.59989
    (switching optimization to BHHH)
    Iteration 15: Log likelihood = -459.59967
    Iteration 16: Log likelihood = -459.59966
    Iteration 17: Log likelihood = -459.59966
    Iteration 18: Log likelihood = -459.59966
    Iteration 19: Log likelihood = -459.59966

    ARIMA regression
```

Sample: **2** thru **1044**, but with gaps   Number of obs   =   **956**
                                                  Wald chi2(**4**)   = **168319.13**
Log likelihood = **-459.5997**   Prob > chi2   =   **0.0000**

D.DTWEXBGS	Coefficient	OPG std. err.	z	P>|z|	[95% conf. interval]	
DTWEXBGS						
_cons	.0044721	.0131207	0.34	0.733	-.021244	.0301881
ARMA						
ar						
L1.	-1.910924	.0268603	-71.14	0.000	-1.963569	-1.858279
L2.	-.9319439	.0272076	-34.25	0.000	-.9852698	-.8786179
ma						
L1.	1.952773	.0192922	101.22	0.000	1.914961	1.990585

L2.	.9750995	.0195315	49.92	0.000	.9368183	1.013381
/sigma	.3907632	.0057844	67.55	0.000	.379426	.4021003

Note: The test of the variance against zero is one sided, and the two-sided
      confidence interval is truncated at zero.

128 .
    end of do-file

129 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

130 . gen D1AR22 = cond(f22 > DTWEXBGS, 1, 0)
    variable D1AR22 already defined
    r(110);

    end of do-file

    r(110);

131 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

132 . gen D2AR22 = cond(DTWEXBGS[_n+1] > DTWEXBGS, 1, 0)
    variable D2AR22 already defined
    r(110);

    end of do-file

    r(110);

133 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

134 . *Calculating the difference*
135 . gen diff22 = DTWEXBGS[_n+1] - DTWEXBGS
    variable diff22 already defined
    r(110);

    end of do-file

    r(110);

136 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

137 . gen loss22 = D1AR22 * weighted_diff22 + (1 - D1AR22) * D2AR22 * weighted_diff2
    > 2
    variable loss22 already defined
    r(110);

    end of do-file

    r(110);

138 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

139 . summarize loss22, mean

140 .
    end of do-file

141 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

142 . display "The average loss of ARMA(2,2) is " r(mean)
    The average loss of ARMA(2,2) is 13.778011

143 .
    end of do-file

144 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

145 . *ARMA(1,1)*
146 . arima d.DTWEXBGS, arima (1,0,1), if t<1045

    Number of gaps in sample = **41**
    (note: filtering over missing observations)

    (setting optimization to BHHH)
    Iteration 0: Log likelihood = **-475.32144**
    Iteration 1: Log likelihood = **-464.45013**
    Iteration 2: Log likelihood = **-462.56631**
    Iteration 3: Log likelihood = **-462.0718**
    Iteration 4: Log likelihood = **-462.03264**
    (switching optimization to BFGS)
    Iteration 5: Log likelihood = **-462.02332**
    Iteration 6: Log likelihood = **-462.01972**
    Iteration 7: Log likelihood = **-462.01968**

    ARIMA regression

    Sample: **2** thru **1044**, but with gaps   Number of obs   =   **956**
                                                         Wald chi2(**2**)   =   **17.82**
    Log likelihood = **-462.0197**   Prob > chi2   =   **0.0001**

D.DTWEXBGS	Coefficient	OPG std. err.	z	P>|z|	[95% conf. interval]	
DTWEXBGS						
_cons	.0038914	.0146561	0.27	0.791	-.0248339	.0326167
ARMA						
ar						
L1.	.4407524	.2390975	1.84	0.065	-.02787	.9093748
ma						
L1.	-.366068	.2504663	-1.46	0.144	-.856973	.124837
/sigma	.392259	.005835	67.23	0.000	.3808227	.4036953

    Note: The test of the variance against zero is one sided, and the two-sided
          confidence interval is truncated at zero.

147 .
    end of do-file

148 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

149 . gen D1AR11 = cond(f11 > DTWEXBGS, 1, 0)
    variable D1AR11 already defined
    r(110);

    end of do-file

    r(110);

150 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

```
151 . gen D2AR11 = cond(DTWEXBGS[_n+1] > DTWEXBGS, 1, 0)
    variable D2AR11 already defined
    r(110);

    end of do-file

    r(110);

152 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

153 . gen diff11 = DTWEXBGS[_n+1] - DTWEXBGS
    variable diff11 already defined
    r(110);

    end of do-file

    r(110);

154 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

155 . gen weighted_diff11 = diff11 * 1000
    variable weighted_diff11 already defined
    r(110);

    end of do-file

    r(110);

156 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

157 . gen loss11 = D1AR11 * weighted_diff11 + (1 - D1AR11) * D2AR11 * weighted_diff1
    > 1
    variable loss11 already defined
    r(110);

    end of do-file

    r(110);

158 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

159 . summarize loss11, mean

160 .
    end of do-file

161 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

162 . display "The average loss of ARMA(1,1) is " r(mean)
    The average loss of ARMA(1,1) is 13.219984

163 .
    end of do-file

164 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

165 . drop D1AR11 D2AR11 diff11 weighted_diff11 loss11

166 .
    end of do-file

167 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"
```

```
168 . ****Computing my loss function****
169 . gen D1AR11 = cond(f11 > DTWEXBGS, 1, 0)

170 . gen D2AR11 = cond(DTWEXBGS[_n+1] > DTWEXBGS, 1, 0)

171 .
    end of do-file

172 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

173 . *Calculating the difference*
174 . gen diff11 = DTWEXBGS[_n+1] - DTWEXBGS
    (129 missing values generated)

175 . gen weighted_diff11 = diff11 * 1000
    (129 missing values generated)

176 . gen loss11 = D1AR11 * weighted_diff11 + (1 - D1AR11) * D2AR11 * weighted_diff1
    > 1
    (129 missing values generated)

177 .
    end of do-file

178 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

179 . summarize loss11, mean

180 .
    end of do-file

181 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

182 . display "The average loss of ARMA(1,1) is " r(mean)
    The average loss of ARMA(1,1) is 13.219984

183 .
    end of do-file

184 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

185 . arima d.DTWEXBGS, arima (1,0,0), if t<1045

    Number of gaps in sample = 41
    (note: filtering over missing observations)

    (setting optimization to BHHH)
    Iteration 0:  Log likelihood = -462.51116
    Iteration 1:  Log likelihood = -462.41012
    Iteration 2:  Log likelihood = -462.39904
    Iteration 3:  Log likelihood = -462.39887
    Iteration 4:  Log likelihood = -462.39885
    (switching optimization to BFGS)
    Iteration 5:  Log likelihood = -462.39885
    Iteration 6:  Log likelihood = -462.39885

    ARIMA regression
```

Sample: **2** thru **1044**, but with gaps   Number of obs   =   956
                                                Wald chi2(**1**)   =   8.67
Log likelihood = **-462.3988**   Prob > chi2   =   0.0032

D.DTWEXBGS	Coefficient	OPG std. err.	z	P>|z|	[95% conf. interval]	
DTWEXBGS						
_cons	.0041965	.0138366	0.30	0.762	-.0229228	.0313157
ARMA						
ar						
L1.	.0778599	.026444	2.94	0.003	.0260306	.1296893
/sigma	.39243	.0057111	68.71	0.000	.3812364	.4036237

```
                    |
    Note: The test of the variance against zero is one sided, and the two-sided
          confidence interval is truncated at zero.

186 .
    end of do-file

187 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

188 . drop D1AR10 D2AR10 diff10 weighted_diff10 loss10

189 .
    end of do-file

190 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

191 . ****Computing my loss function****
192 . gen D1AR10 = cond(f10 > DTWEXBGS, 1, 0)

193 . gen D2AR10 = cond(DTWEXBGS[_n+1] > DTWEXBGS, 1, 0)

194 . *Calculating the difference*
195 . gen diff10 = DTWEXBGS[_n+1] - DTWEXBGS
    (129 missing values generated)

196 . gen weighted_diff10 = diff10 * 1000
    (129 missing values generated)

197 . gen loss10 = D1AR10 * weighted_diff10 + (1 - D1AR10) * D2AR10 * weighted_diff1
    > 0
    (129 missing values generated)

198 . summarize loss10, mean

199 .
    end of do-file

200 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

201 . display "The average loss of ARMA(1,0) is " r(mean)
    The average loss of ARMA(1,0) is 13.219984

202 .
    end of do-file

203 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

204 . *ARMA(2,0)*
205 . arima d.DTWEXBGS, arima (2,0,0), if t<1045

    Number of gaps in sample = 41
    (note: filtering over missing observations)

    (setting optimization to BHHH)
    Iteration 0:  Log likelihood = -462.47204
    Iteration 1:  Log likelihood = -462.29867
    Iteration 2:  Log likelihood = -462.27757
    Iteration 3:  Log likelihood = -462.27458
    Iteration 4:  Log likelihood = -462.27378
    (switching optimization to BFGS)
    Iteration 5:  Log likelihood =  -462.2736
    Iteration 6:  Log likelihood = -462.27354
    Iteration 7:  Log likelihood = -462.27354

    ARIMA regression

    Sample: 2 thru 1044, but with gaps        Number of obs   =      956
                                              Wald chi2(2)    =     9.05
    Log likelihood = -462.2735                Prob > chi2     =   0.0108
```

D.DTWEXBGS	Coefficient	OPG std. err.	z	P>|z|	[95% conf. interval]	
DTWEXBGS						
_cons	.0040912	.0140525	0.29	0.771	-.0234513	.0316337
ARMA						
ar						
L1.	.0764799	.026567	2.88	0.004	.0244096	.1285502
L2.	.0166123	.0260048	0.64	0.523	-.0343561	.0675807
/sigma	.3923761	.0059301	66.17	0.000	.3807534	.4039988

Note: The test of the variance against zero is one sided, and the two-sided
      confidence interval is truncated at zero.

206 .
    end of do-file

207 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

208 . drop loss20 D1AR20 D2AR20 diff20 weighted_diff20 loss20

209 .
    end of do-file

210 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

211 . ****Computing my loss function (Original)****
212 . gen D1AR20 = cond(f20 > DTWEXBGS, 1, 0)

213 . gen D2AR20 = cond(DTWEXBGS[_n+1] > DTWEXBGS, 1, 0)

214 . *Calculating the difference*
215 . gen diff20 = DTWEXBGS[_n+1] - DTWEXBGS
    (129 missing values generated)

216 . gen weighted_diff20 = diff20 * 1000
    (129 missing values generated)

217 . gen loss20 = D1AR20 * weighted_diff20 + (1 - D1AR20) * D2AR20 * weighted_diff2
    > 0
    (129 missing values generated)

218 . summarize loss20, mean

219 . display "The average loss of ARMA(2,0) is " r(mean)
    The average loss of ARMA(2,0) is 13.219984

220 .
    end of do-file

221 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

222 . *ARMA(3,0)*
223 . arima d.DTWEXBGS, arima (3,0,0), if t<1045

    Number of gaps in sample = **41**
    (note: filtering over missing observations)

    (setting optimization to BHHH)
    Iteration 0: Log likelihood = **-461.56962**
    Iteration 1: Log likelihood = **-461.1131**
    Iteration 2: Log likelihood = **-461.06942**
    Iteration 3: Log likelihood = **-461.06208**
    Iteration 4: Log likelihood = **-461.06008**
    (switching optimization to BFGS)
    Iteration 5: Log likelihood = **-461.05953**
    Iteration 6: Log likelihood = **-461.05935**
    Iteration 7: Log likelihood = **-461.05934**

    ARIMA regression

Sample: **2** thru **1044**, but with gaps   Number of obs   =   **956**
                                                       Wald chi2(**3**)   =   **13.26**
Log likelihood = **-461.0593**   Prob > chi2   =   **0.0041**

D.DTWEXBGS	Coefficient	OPG std. err.	z	P>|z|	[95% conf. interval]	
DTWEXBGS						
_cons	.003731	.0151165	0.25	0.805	-.0258969	.0333588
ARMA						
ar						
L1.	.076179	.0265885	2.87	0.004	.0240665	.1282915
L2.	.0105441	.0259028	0.41	0.684	-.0402245	.0613126
L3.	.0518977	.0233528	2.22	0.026	.006127	.0976684
/sigma	.3918323	.0059055	66.35	0.000	.3802578	.4034068

Note: The test of the variance against zero is one sided, and the two-sided
      confidence interval is truncated at zero.

224 .
    end of do-file

225 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

226 . drop D1AR30 D2AR30 diff30 weighted_diff loss30

227 .
    end of do-file

228 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

229 . ****Computing my loss function****
230 . gen D1AR30 = cond(f30 > DTWEXBGS, 1, 0)

231 . gen D2AR30 = cond(DTWEXBGS[_n+1] > DTWEXBGS, 1, 0)

232 . *Calculating the difference*
233 . gen diff30 = DTWEXBGS[_n+1] - DTWEXBGS
    (129 missing values generated)

234 . gen weighted_diff = diff * 1000
    (182 missing values generated)

235 . gen loss30 = D1AR30 * weighted_diff + (1 - D1AR30) * D2AR30 * weighted_diff
    (182 missing values generated)

236 . summarize loss30, mean

237 . display "The average loss of ARMA(3,0) is " r(mean)
    The average loss of ARMA(3,0) is 24.388101

238 .
    end of do-file

239 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

240 . *ARMA(4,0)*
241 . arima d.DTWEXBGS, arima (4,0,0), if t<1045

    Number of gaps in sample = **41**
    (note: filtering over missing observations)

```
(setting optimization to BHHH)
Iteration 0:  Log likelihood = -461.37218
Iteration 1:  Log likelihood = -461.03662
Iteration 2:  Log likelihood = -460.99199
Iteration 3:  Log likelihood = -460.98334
Iteration 4:  Log likelihood = -460.98068
(switching optimization to BFGS)
Iteration 5:  Log likelihood = -460.97979
Iteration 6:  Log likelihood = -460.97932
Iteration 7:  Log likelihood = -460.97931
```

ARIMA regression

Sample: **2** thru **1044**, but with gaps

Log likelihood = **-460.9793**

	Number of obs	=	**956**
	Wald chi2(**4**)	=	**12.22**
	Prob > chi2	=	**0.0158**

D.DTWEXBGS	Coefficient	OPG std. err.	z	P>|z|	[95% conf. interval]	
DTWEXBGS						
_cons	.0038796	.0149328	0.26	0.795	-.0253881	.0331474
ARMA						
ar						
L1.	.076745	.0282309	2.72	0.007	.0214135	.1320764
L2.	.0105361	.0260717	0.40	0.686	-.0405635	.0616357
L3.	.053097	.0238447	2.23	0.026	.0063622	.0998318
L4.	-.0130615	.0238479	-0.55	0.584	-.0598025	.0336795
/sigma	.3917939	.0059073	66.32	0.000	.3802159	.4033719

Note: The test of the variance against zero is one sided, and the two-sided
       confidence interval is truncated at zero.

```
242 .
    end of do-file

243 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

244 . display "The average loss of ARMA(4,0) is " r(mean)
    The average loss of ARMA(4,0) is .

245 .
    end of do-file

246 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

247 . summarize loss40, mean

248 .
    end of do-file

249 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

250 . display "The average loss of ARMA(4,0) is " r(mean)
    The average loss of ARMA(4,0) is 35.741031

251 .
    end of do-file
```

252 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

253 . *ARMA(0,1)*
254 . arima d.DTWEXBGS, arima (0,0,1), if t<1045

    Number of gaps in sample = **41**
    (note: filtering over missing observations)

    (setting optimization to BHHH)
    Iteration 0: Log likelihood = **-475.20428**
    Iteration 1: Log likelihood = **-464.52874**
    Iteration 2: Log likelihood = **-462.7046**
    Iteration 3: Log likelihood = **-462.4987**
    Iteration 4: Log likelihood = **-462.48532**
    (switching optimization to BFGS)
    Iteration 5: Log likelihood = **-462.48253**
    Iteration 6: Log likelihood = **-462.48203**
    Iteration 7: Log likelihood =   **-462.482**

    ARIMA regression

    Sample: **2** thru **1044**, but with gaps   Number of obs   =   **956**
                                                         Wald chi2(**1**)   =   **8.20**
    Log likelihood = **-462.482**   Prob > chi2   =   **0.0042**

D.DTWEXBGS	Coefficient	OPG std. err.	z	P>|z|	[95% conf. interval]	
DTWEXBGS						
_cons	.0042417	.0137358	0.31	0.757	-.0226799	.0311633
ARMA						
ma						
L1.	.0758698	.0264929	2.86	0.004	.0239447	.1277948
/sigma	.3924717	.0056445	69.53	0.000	.3814087	.4035347

    Note: The test of the variance against zero is one sided, and the two-sided
          confidence interval is truncated at zero.

255 .
    end of do-file

256 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

257 . summarize loss01, mean

258 .
    end of do-file

259 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

260 . display "The average loss of ARMA(0,1) is " r(mean)
    The average loss of ARMA(0,1) is 24.35293

261 .
    end of do-file

262 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

263 . *ARMA(1,2)*

264 . arima d.DTWEXBGS, arima (1,0,2), if t<1045

    Number of gaps in sample = **41**
    (note: filtering over missing observations)

    (setting optimization to BHHH)
    Iteration 0: Log likelihood = **-474.55734**
    Iteration 1: Log likelihood = **-469.41091**
    Iteration 2: Log likelihood = **-463.4142**
    Iteration 3: Log likelihood = **-463.31199**
    Iteration 4: Log likelihood = **-462.33453**
    (switching optimization to BFGS)
    Iteration 5: Log likelihood = **-462.17578**
    Iteration 6: Log likelihood = **-462.08366**
    Iteration 7: Log likelihood = **-462.02484**
    Iteration 8: Log likelihood = **-462.01563**
    Iteration 9: Log likelihood = **-462.01513**
    Iteration 10: Log likelihood = **-462.01503**
    Iteration 11: Log likelihood = **-462.01499**
    Iteration 12: Log likelihood = **-462.01499**

    ARIMA regression

    Sample: **2** thru **1044**, but with gaps   Number of obs   =   **956**
                                                Wald chi2(**3**)   =   **18.65**
    Log likelihood = **-462.015**   Prob > chi2   =   **0.0003**

D.DTWEXBGS	Coefficient	OPG std. err.	z	P>|z|	[95% conf. interval]	
DTWEXBGS						
_cons	.0039004	.0148495	0.26	0.793	-.0252041	.0330049
ARMA						
ar						
L1.	.4640994	.4885858	0.95	0.342	-.4935112	1.42171
ma						
L1.	-.3883209	.492092	-0.79	0.430	-1.352804	.5761618
L2.	-.0045828	.0525241	-0.09	0.930	-.1075282	.0983625
/sigma	.3922627	.0059916	65.47	0.000	.3805194	.404006

    Note: The test of the variance against zero is one sided, and the two-sided
          confidence interval is truncated at zero.

265 .
    end of do-file

266 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

267 . summarize loss12, mean

268 .
    end of do-file

269 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

270 . display "The average loss of ARMA(1,2) is " r(mean)
    The average loss of ARMA(1,2) is 13.219984

271 .
    end of do-file

272 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

273 . *ARMA(1,3)*
274 . arima DTWEXBGS, arima (1,0,3), if t<1045

    Number of gaps in sample = **42**
    (note: filtering over missing observations)

    (setting optimization to BHHH)
    Iteration 0: Log likelihood = **-601.65633**
    Iteration 1: Log likelihood = **-495.2259**
    Iteration 2: Log likelihood = **-492.23585**
    Iteration 3: Log likelihood = **-490.72715**
    Iteration 4: Log likelihood = **-490.55459**
    (switching optimization to BFGS)
    Iteration 5: Log likelihood = **-490.25275**
    Iteration 6: Log likelihood = **-490.09968**
    Iteration 7: Log likelihood = **-490.07617**
    Iteration 8: Log likelihood = **-490.07387**
    Iteration 9: Log likelihood = **-490.07381**
    Iteration 10: Log likelihood = **-490.07381**
    Iteration 11: Log likelihood = **-490.07381**

    ARIMA regression

    Sample: **1** thru **1044**, but with gaps   Number of obs   =   **999**
                                                       Wald chi2(**4**)   =   **99537.71**
    Log likelihood = **-490.0738**   Prob > chi2   =   **0.0000**

DTWEXBGS	Coefficient	OPG std. err.	z	P>|z|	[95% conf. interval]	
DTWEXBGS						
_cons	**117.4167**	**2.387184**	**49.19**	**0.000**	**112.7379**	**122.0955**
ARMA						
ar						
L1.	.9937159	.0032268	307.95	0.000	.9873914	1.00004
ma						
L1.	.0706877	.0269987	2.62	0.009	.0177712	.1236041
L2.	.0229326	.0248085	0.92	0.355	-.0256912	.0715565
L3.	.0687419	.0243337	2.82	0.005	.0210487	.116435
/sigma	**.3877428**	**.005813**	**66.70**	**0.000**	**.3763495**	**.3991361**

    Note: The test of the variance against zero is one sided, and the two-sided
          confidence interval is truncated at zero.

275 .
    end of do-file

276 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

277 . summarize loss21, mean

278 .
    end of do-file

```
279 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

280 . display "The average loss of ARMA(2,1) is " r(mean)
    The average loss of ARMA(2,1) is 24.35293

281 .
    end of do-file

282 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

283 . drop r

284 .
    end of do-file

285 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

286 . *ARMA(1,3)*
287 . arima DTWEXBGS, arima (1,0,3), if t<1045

    Number of gaps in sample = 42
    (note: filtering over missing observations)

    (setting optimization to BHHH)
    Iteration 0:  Log likelihood = -601.65633
    Iteration 1:  Log likelihood =  -495.2259
    Iteration 2:  Log likelihood = -492.23585
    Iteration 3:  Log likelihood = -490.72715
    Iteration 4:  Log likelihood = -490.55459
    (switching optimization to BFGS)
    Iteration 5:  Log likelihood = -490.25275
    Iteration 6:  Log likelihood = -490.09968
    Iteration 7:  Log likelihood = -490.07617
    Iteration 8:  Log likelihood = -490.07387
    Iteration 9:  Log likelihood = -490.07381
    Iteration 10: Log likelihood = -490.07381
    Iteration 11: Log likelihood = -490.07381

    ARIMA regression
```

Sample: **1** thru **1044**, but with gaps

Log likelihood = **-490.0738**

Number of obs   =   **999**
Wald chi2(**4**) = **99537.71**
Prob > chi2   =   **0.0000**

DTWEXBGS	Coefficient	OPG std. err.	z	P>|z|	[95% conf. interval]	
DTWEXBGS						
_cons	**117.4167**	**2.387184**	**49.19**	**0.000**	**112.7379**	**122.0955**
ARMA						
ar						
L1.	.9937159	.0032268	307.95	0.000	.9873914	1.00004
ma						
L1.	.0706877	.0269987	2.62	0.009	.0177712	.1236041
L2.	.0229326	.0248085	0.92	0.355	-.0256912	.0715565
L3.	.0687419	.0243337	2.82	0.005	.0210487	.116435
/sigma	.3877428	.005813	66.70	0.000	.3763495	.3991361

Note: The test of the variance against zero is one sided, and the two-sided
      confidence interval is truncated at zero.

288 . ion_date)
    command ion_date is unrecognized
    <u>r(199);</u>

    end of do-file

    <u>r(199);</u>

289 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

290 . *Check residuals
291 . predict r, r
    (75 missing values generated)

292 . twoway (line r observation_date)

293 .
    end of do-file

294 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

295 . wntestq r
    (note: time series has 53 gaps)

    Portmanteau test for white noise
    ─────────────────────────────────
     Portmanteau (Q) statistic =   **46.7719**
     Prob > chi2(**40**)   =   **0.2142**

296 . display "adj p-valu = " chi2tail(r(df)-4,r(stat))
    adj p-valu = .10784071

297 . estat aroots

        Eigenvalue stability condition

Eigenvalue	Modulus
.9937159	**.993716**

    All the eigenvalues lie inside the unit circle.
    AR parameters satisfy stability condition.

        Eigenvalue stability condition

Eigenvalue	Modulus
-.4148453	**.414845**
.1720788 + .3689088i	**.407069**
.1720788 - .3689088i	**.407069**

    All the eigenvalues lie inside the unit circle.
    MA parameters satisfy invertibility condition.

298 .
    end of do-file

299 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

300 . estat ic

    Akaike's information criterion and Bayesian information criterion

Model	N	ll(null)	ll(model)	df	AIC	BIC
.	**999**	.	**-490.0738**	**6**	**992.1476**	**1021.588**

    Note: BIC uses N = number of observations. See **[R] IC note**.

```
301 . predict r, r
    variable r already defined
    r(110);

    end of do-file

    r(110);

302 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

303 . display "adj p-valu = " chi2tail(r(df)-4,r(stat))
    adj p-valu = .

304 . estat aroots
```

Eigenvalue stability condition

Eigenvalue	Modulus
.9937159	.993716

```
    All the eigenvalues lie inside the unit circle.
    AR parameters satisfy stability condition.
```

Eigenvalue stability condition

Eigenvalue	Modulus
-.4148453	.414845
.1720788 + .3689088i	.407069
.1720788 - .3689088i	.407069

```
    All the eigenvalues lie inside the unit circle.
    MA parameters satisfy invertibility condition.

305 . matrix absroots = r(Modulus_ar)

306 .
    end of do-file

307 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

308 . mata:
                                                 ──────── mata (type end to exit) ────────
    :   absroots = st_matrix("absroots")

    :   highestroot = max(absroots)

    :   st_numscalar("highestroot", highestroot)

    : end
    ──────────────────────────────────────────────────────────────────────────────

309 .
    end of do-file

310 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

311 . display "The highest absolute value of the AR root is: " highestroot
    The highest absolute value of the AR root is: .99371591

312 .
    end of do-file
```

```
313 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

314 . predict f13, y

315 . replace f13 = . if t<1045
    (1,044 real changes made, 1,044 to missing)

316 .
    end of do-file

317 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

318 . line (DTWEXBGS f13 t) if t>1045

319 . gen df13 = d.f13
    (1,045 missing values generated)

320 . line (dDTWEXBGS df13 t) if t>1045

321 .
    end of do-file

322 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

323 . summarize loss12, mean

324 .
    end of do-file

325 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

326 . display "The average loss of ARMA(1,2) is " r(mean)
    The average loss of ARMA(1,2) is 13.219984

327 .
    end of do-file

328 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

329 . summarize loss11, mean

330 .
    end of do-file

331 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

332 . display "The average loss of ARMA(1,1) is " r(mean)
    The average loss of ARMA(1,1) is 13.219984

333 .
    end of do-file

334 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

335 . *Checking stability*
336 . varstable, graph
    varstable can only be run after var or svar
    r(198);

    end of do-file

    r(198);
```

337 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

338 . var d.CRUDEOIL d.GOLDETF d.DTWEXBGS if t<1045, lags(1/3) lutstats dfk small

Vector autoregression

```
Sample: 5 thru 1044, but with gaps          Number of obs    =        769
Log likelihood = -3225.457     (lutstats) AIC            =   -.0547051
FPE            =   .9541843                HQIC           =    .008064
Det(Sigma_ml)  =   .882562                 SBIC           =   .1083865
```

Equation	Parms	RMSE	R-sq	F	P > F
D_CRUDEOIL	10	2.12056	0.0213	1.832765	0.0591
D_GOLDETF	10	1.18647	0.0380	3.332167	0.0005
D_DTWEXBGS	10	.394327	0.0464	4.107255	0.0000

	Coefficient	Std. err.	t	P>|t|	[95% conf. interval]	
D_CRUDEOIL						
CRUDEOIL						
LD.	.0688916	.0368529	1.87	0.062	-.0034541	.1412373
L2D.	-.039525	.0372894	-1.06	0.290	-.1127276	.0336777
L3D.	-.0363207	.0372497	-0.98	0.330	-.1094454	.036804
GOLDETF						
LD.	-.040513	.0652853	-0.62	0.535	-.1686742	.0876482
L2D.	.0067883	.0667658	0.10	0.919	-.1242793	.1378559
L3D.	-.1958665	.0668647	-2.93	0.003	-.3271283	-.0646047
DTWEXBGS						
LD.	-.0137505	.1989321	-0.07	0.945	-.4042729	.3767719
L2D.	.2277818	.1979128	1.15	0.250	-.1607396	.6163033
L3D.	.1194443	.1971604	0.61	0.545	-.2676002	.5064888
_cons	.0347471	.0766259	0.45	0.650	-.1156768	.1851709
D_GOLDETF						
CRUDEOIL						
LD.	.0578008	.0206196	2.80	0.005	.0173226	.0982789
L2D.	.0187322	.0208638	0.90	0.370	-.0222254	.0596897
L3D.	.0032127	.0208416	0.15	0.878	-.0377013	.0441267
GOLDETF						
LD.	-.012914	.0365277	-0.35	0.724	-.0846214	.0587934
L2D.	-.0232812	.0373561	-0.62	0.533	-.0966148	.0500524
L3D.	-.1246064	.0374115	-3.33	0.001	-.1980487	-.0511642
DTWEXBGS						
LD.	.2263581	.1113044	2.03	0.042	.0078571	.4448592
L2D.	.1759652	.1107341	1.59	0.112	-.0414163	.3933467
L3D.	.2868528	.1103132	2.60	0.009	.0702977	.5034079
_cons	.0080992	.0428729	0.19	0.850	-.0760644	.0922629
D_DTWEXBGS						
CRUDEOIL						
LD.	-.0074816	.0068529	-1.09	0.275	-.0209346	.0059714
L2D.	-.0060662	.0069341	-0.87	0.382	-.0196785	.0075461
L3D.	-.0097172	.0069267	-1.40	0.161	-.0233151	.0038806
GOLDETF						
LD.	.0443562	.0121401	3.65	0.000	.0205241	.0681883
L2D.	-.0136654	.0124154	-1.10	0.271	-.0380379	.0107072
L3D.	.0356685	.0124338	2.87	0.004	.0112598	.0600771
DTWEXBGS						
LD.	.0848956	.0369922	2.29	0.022	.0122764	.1575148
L2D.	-.0183059	.0368027	-0.50	0.619	-.090553	.0539412
L3D.	.0067465	.0366628	0.18	0.854	-.065226	.078719
_cons	.0060281	.0142489	0.42	0.672	-.0219438	.034

Note: Small-sample degrees-of-freedom adjustment applied when estimating
      covariance matrix of residuals.

339 .
    end of do-file

340 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

341 . *Checking stability*
342 . varstable, graph

Eigenvalue stability condition

Eigenvalue	Modulus
.3074991 + .4628732i	.555704
.3074991 - .4628732i	.555704
-.543757	.543757
.4545817	.454582
.1430915 + .4123453i	.436467
.1430915 - .4123453i	.436467
-.1611555 + .3687392i	.402417
-.1611555 - .3687392i	.402417
-.3488217	.348822

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

343 .
    end of do-file

344 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

345 . ac diff_error11_22
    (note: time series has 11 gaps)

346 .
    end of do-file

347 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

348 . regress diff_error11_22

Source	SS	df	MS			
				Number of obs	=	240
				F(0, 239)	=	0.00
Model	0	0	.	Prob > F	=	.
Residual	.794912465	239	.003325994	R-squared	=	0.0000
				Adj R-squared	=	0.0000
Total	.794912465	239	.003325994	Root MSE	=	.05767

diff_erro~22	Coefficient	Std. err.	t	P>|t|	[95% conf. interval]	
_cons	-.0053639	.0037227	-1.44	0.151	-.0126974	.0019695

349 .
    end of do-file

350 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

351 . regress diff_error11_10

Source	SS	df	MS		Number of obs	=	240
					F(0, 239)	=	0.00
Model	0	0	.		Prob > F	=	.
Residual	.025451982	239	.000106494		R-squared	=	0.0000
					Adj R-squared	=	0.0000
Total	.025451982	239	.000106494		Root MSE	=	.01032

diff_erro~10	Coefficient	Std. err.	t	P>|t|	[95% conf. interval]	
_cons	.0005484	.0006661	0.82	0.411	-.0007638	.0018606

352 .
    end of do-file

353 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

354 . *ARMA(1,1) VS ARMA(2,0)
355 . gen diff_error11_20 = abs_error11 - abs_error20
    variable diff_error11_20 already defined
    r(110);

    end of do-file

    r(110);

356 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

357 . ac diff_error11_10
    (note: time series has 11 gaps)

358 .
    end of do-file

359 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

360 . ac diff_error11_20
    (note: time series has 11 gaps)

361 .
    end of do-file

362 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

363 . regress diff_error11_20

Source	SS	df	MS		Number of obs	=	240
					F(0, 239)	=	0.00
Model	0	0	.		Prob > F	=	.
Residual	.006784289	239	.000028386		R-squared	=	0.0000
					Adj R-squared	=	0.0000
Total	.006784289	239	.000028386		Root MSE	=	.00533

diff_erro~20	Coefficient	Std. err.	t	P>|t|	[95% conf. interval]	
_cons	.0000537	.0003439	0.16	0.876	-.0006238	.0007311

364 .
    end of do-file

365 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

366 . ac diff_error11_20
    (note: time series has 11 gaps)

367 .
    end of do-file

368 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

369 . ac diff_error11_30
    (note: time series has 11 gaps)

370 .
    end of do-file

371 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

372 . regress diff_error11_30

Source	SS	df	MS		
Model	0	0	.	Number of obs	= 240
Residual	.057591725	239	.00024097	F(0, 239)	= 0.00
				Prob > F	= .
				R-squared	= 0.0000
				Adj R-squared	= 0.0000
Total	.057591725	239	.00024097	Root MSE	= .01552

diff_erro~30	Coefficient	Std. err.	t	P>|t|	[95% conf. interval]
_cons	.0005873	.001002	0.59	0.558	-.0013866 .0025612

373 .
    end of do-file

374 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

375 . ac diff_error11_40
    (note: time series has 13 gaps)

376 .
    end of do-file

377 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

378 . regress diff_error11_40

Source	SS	df	MS		
Model	0	0	.	Number of obs	= 189
Residual	.564760597	188	.003004046	F(0, 188)	= 0.00
				Prob > F	= .
				R-squared	= 0.0000
				Adj R-squared	= 0.0000
Total	.564760597	188	.003004046	Root MSE	= .05481

diff_erro~40	Coefficient	Std. err.	t	P>|t|	[95% conf. interval]
_cons	-.0049378	.0039868	-1.24	0.217	-.0128024 .0029268

379 .
    end of do-file

380 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

381 . ac diff_error11_01
    (note: time series has 11 gaps)

382 .
    end of do-file

383 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

384 . regress diff_error11_01

Source	SS	df	MS		Number of obs	=	240
					F(0, 239)	=	0.00
Model	0	0	.		Prob > F	=	.
Residual	.035013882	239	.000146502		R-squared	=	0.0000
					Adj R-squared	=	0.0000
Total	.035013882	239	.000146502		Root MSE	=	.0121

diff_erro~01	Coefficient	Std. err.	t	P>|t|	[95% conf. interval]	
_cons	.0007637	.0007813	0.98	0.329	-.0007754	.0023028

385 .
    end of do-file

386 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

387 . ac diff_error11_12
    (note: time series has 11 gaps)

388 .
    end of do-file

389 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

390 . regress diff_error11_12

Source	SS	df	MS		Number of obs	=	228
					F(0, 227)	=	0.00
Model	0	0	.		Prob > F	=	.
Residual	18.2741093	227	.080502684		R-squared	=	0.0000
					Adj R-squared	=	0.0000
Total	18.2741093	227	.080502684		Root MSE	=	.28373

diff_~r11_12	Coefficient	Std. err.	t	P>|t|	[95% conf. interval]	
_cons	-.1277216	.0187905	-6.80	0.000	-.1647476	-.0906955

391 .
    end of do-file

392 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

393 . ac diff_error11_VR4
    (note: time series has 13 gaps)

```
394 .
    end of do-file

395 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

396 . regress diff_error11_VR3
```

Source	SS	df	MS	Number of obs	=	176
				F(0, 175)	=	0.00
Model	0	0	.	Prob > F	=	.
Residual	.618263432	175	.003532934	R-squared	=	0.0000
				Adj R-squared	=	0.0000
Total	.618263432	175	.003532934	Root MSE	=	.05944

diff_error~3	Coefficient	Std. err.	t	P>|t|	[95% conf. interval]	
_cons	-.0053453	.0044803	-1.19	0.234	-.0141878	.0034971

```
397 .
    end of do-file

398 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

399 . ac diff_error11_VR4
    (note: time series has 13 gaps)

400 .
    end of do-file

401 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

402 . gen diff_error11_VR3= abs_error11 - abs_errorVR3
    variable diff_error11_VR3 already defined
    r(110);

    end of do-file

    r(110);

403 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

404 . drop diff_error11_VR3

405 .
    end of do-file

406 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

407 . gen diff_error11_VR3= abs_error11 - abs_errorVR3
    (1,136 missing values generated)

408 .
    end of do-file

409 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

410 . ac diff_error11_VR4
    (note: time series has 13 gaps)

411 .
    end of do-file
```

412 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

413 . ac diff_error11_VR3
    (note: time series has 13 gaps)

414 .
    end of do-file

415 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

416 . regress diff_error11_VR3

Source	SS	df	MS
Model	0	0	.
Residual	.564760597	188	.003004046
Total	.564760597	188	.003004046

Number of obs = 189
F(0, 188) = 0.00
Prob > F = .
R-squared = 0.0000
Adj R-squared = 0.0000
Root MSE = .05481

diff_error~3	Coefficient	Std. err.	t	P>|t|	[95% conf. interval]
_cons	-.0049378	.0039868	-1.24	0.217	-.0128024 .0029268

417 .
    end of do-file

418 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

419 . ac diff_error11_VR3
    (note: time series has 13 gaps)

420 .
    end of do-file

421 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

422 . regress diff_error11_VR3

Source	SS	df	MS
Model	0	0	.
Residual	.564760597	188	.003004046
Total	.564760597	188	.003004046

Number of obs = 189
F(0, 188) = 0.00
Prob > F = .
R-squared = 0.0000
Adj R-squared = 0.0000
Root MSE = .05481

diff_error~3	Coefficient	Std. err.	t	P>|t|	[95% conf. interval]
_cons	-.0049378	.0039868	-1.24	0.217	-.0128024 .0029268

423 .
    end of do-file

424 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

425 . ac diff_error11_VR5
    (note: time series has 12 gaps)

426 .
    end of do-file

427 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

428 . regress diff_error11_VR5

```
      Source |       SS           df       MS      Number of obs   =       164
-------------+----------------------------------   F(0, 163)       =      0.00
       Model |          0            0        .     Prob > F        =         .
    Residual | 1.00166822          163  .006145204   R-squared       =    0.0000
-------------+----------------------------------   Adj R-squared   =    0.0000
       Total | 1.00166822          163  .006145204   Root MSE        =    .07839
```

```
  diff_error~5 | Coefficient  Std. err.      t    P>|t|     [95% conf. interval]
-------------+----------------------------------------------------------------
        _cons |  -.0058974    .0061213    -0.96   0.337    -.0179848    .0061899
```

429 .
      end of do-file

430 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

431 . *ARMA(1,1) vs ARMA(1,2)
432 . * Calculate the differences in forecast errors
433 . gen diff_errors_11_12 = abs_error11 - abs_error12
      variable diff_errors_11_12 already defined
      r(110);

      end of do-file

      r(110);

434 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

435 . ac diff_errors_11_12
      (note: time series has 11 gaps)

436 .
      end of do-file

437 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

438 . ac diff_errors_40_10
      variable diff_errors_40_10 not found
      r(111);

      end of do-file

      r(111);

439 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

440 . gen diff_errors_40_10 = abs_error40 - abs_error10
      (1,136 missing values generated)

441 .
      end of do-file

442 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

443 . gen diff_errors_11_20 = abs_error11 - abs_error20
      (1,085 missing values generated)

444 .
    end of do-file

445 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

446 . ac diff_errors_11_20
    (note: time series has 11 gaps)

447 .
    end of do-file

448 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

449 . regress diff_errors_11_20

Source	SS	df	MS	Number of obs	=	240
				F(0, 239)	=	0.00
Model	0	0	.	Prob > F	=	.
Residual	.006784289	239	.000028386	R-squared	=	0.0000
				Adj R-squared	=	0.0000
Total	.006784289	239	.000028386	Root MSE	=	.00533

diff_~_11_20	Coefficient	Std. err.	t	P>|t|	[95% conf. interval]	
_cons	.0000537	.0003439	0.16	0.876	-.0006238	.0007311

450 .
    end of do-file

451 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

452 . ac diff_errors_11_20
    (note: time series has 11 gaps)

453 .
    end of do-file

454 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

455 . ac diff_error11_01
    (note: time series has 11 gaps)

456 .
    end of do-file

457 . do "C:\Users\SREERA~1\AppData\Local\Temp\STD28fc_000000.tmp"

458 . regress diff_error11_01

Source	SS	df	MS	Number of obs	=	240
				F(0, 239)	=	0.00
Model	0	0	.	Prob > F	=	.
Residual	.035013882	239	.000146502	R-squared	=	0.0000
				Adj R-squared	=	0.0000
Total	.035013882	239	.000146502	Root MSE	=	.0121

diff_erro~01	Coefficient	Std. err.	t	P>|t|	[95% conf. interval]	
_cons	.0007637	.0007813	0.98	0.329	-.0007754	.0023028

459 .
    end of do-file

460 .