Table of Contents

ARIMA NASDAQ

```
load('NDX.mat');
y = NDX;
T = length(y);
t = (1:T);
ly = log(y);
K = (0:20)';
```

Stima modelli ARIMA

```
%ARIMA(1,1,0)
Mdl = arima(1,1,0);            % definizione del modello ARIMA(1,1,0)
EstMdl10 = estimate(Mdl,ly);  % stima del modello definito sui dati
 della serie storica
res10 = infer(EstMdl10,ly);
% ARIMA(0,1,1)
Mdl = arima(0,1,1);
EstMdl01 = estimate(Mdl,ly);
res01 = infer(EstMdl01,ly);
```

```
% ARIMA(1,1,1)
Mdl = arima(1,1,1);
EstMdl11 = estimate(Mdl,ly);
res11 = infer(EstMdl11,ly);
% ARIMA(2,1,0)
Mdl = arima(2,1,0);
EstMdl20 = estimate(Mdl,ly);
res20 = infer(EstMdl20,ly);
% ARIMA(0,1,2)
Mdl = arima(0,1,2);
EstMdl02 = estimate(Mdl,ly);
res02 = infer(EstMdl02,ly);
% ARIMA(2,1,1)
Mdl = arima(2,1,1);
EstMdl21 = estimate(Mdl,ly);
res21 = infer(EstMdl21,ly);
% ARIMA(1,1,2)
Mdl = arima(1,1,2);
EstMdl12 = estimate(Mdl,ly);
res12 = infer(EstMdl12,ly);
% ARIMA(2,1,2)
Mdl = arima(2,1,2);
EstMdl22 = estimate(Mdl,ly);
res22 = infer(EstMdl22,ly);
% ARIMA(2,1,0), 3-4
Mdl = arima('ArLags',[3 4],'D',1,'MaLags',[]);
EstMdl340 = estimate(Mdl,ly);
res340 = infer(EstMdl340,ly);
% ARIMA(0,1,2), 3-4
Mdl = arima('ArLags',[],'D',1,'MaLags',[3 4]);
EstMdl034 = estimate(Mdl,ly);
res034 = infer(EstMdl034,ly);
% ARIMA(2,1,2), 3-4
Mdl = arima('ArLags',[3 4],'D',1,'MaLags',[3 4]);
EstMdl3434 = estimate(Mdl,ly);
res3434 = infer(EstMdl3434,ly);
```

```
    ARIMA(1,1,0) Model:
    --------------------
    Conditional Probability Distribution: Gaussian

                                  Standard          t
     Parameter       Value          Error       Statistic
    -----------   -----------   ------------   -----------
     Constant    0.000555734   0.000271965        2.04341
        AR{1}      0.0228532     0.0206712        1.10556
     Variance    8.97064e-05   2.48051e-06        36.1645

    ARIMA(0,1,1) Model:
    --------------------
    Conditional Probability Distribution: Gaussian

                                  Standard          t
```

Parameter	Value	Error	Statistic
Constant	0.000567465	0.0002787	2.03611
MA{1}	0.0236948	0.0206558	1.14713
Variance	8.94659e-05	2.46873e-06	36.2396

ARIMA(1,1,1) Model:

Conditional Probability Distribution: Gaussian

Parameter	Value	Standard Error	t Statistic
Constant	0.000608959	0.000559077	1.08922
AR{1}	-0.0725011	0.970821	-0.0746802
MA{1}	0.0962038	0.970265	0.0991521
Variance	8.94876e-05	2.48987e-06	35.9406

ARIMA(2,1,0) Model:

Conditional Probability Distribution: Gaussian

Parameter	Value	Standard Error	t Statistic
Constant	0.000564781	0.000277986	2.03169
AR{1}	0.0232409	0.0206247	1.12685
AR{2}	-0.0159139	0.0226923	-0.701288
Variance	8.94676e-05	2.50031e-06	35.7826

ARIMA(0,1,2) Model:

Conditional Probability Distribution: Gaussian

Parameter	Value	Standard Error	t Statistic
Constant	0.0005685	0.000284483	1.99836
MA{1}	0.0213777	0.0206444	1.03552
MA{2}	-0.0143683	0.0227804	-0.630729
Variance	8.9473e-05	2.49896e-06	35.8041

ARIMA(2,1,1) Model:

Conditional Probability Distribution: Gaussian

Parameter	Value	Standard Error	t Statistic
Constant	0.000158659	0.000115054	1.37899
AR{1}	0.793469	0.125466	6.32418
AR{2}	-0.0655226	0.0218715	-2.9958
MA{1}	-0.775071	0.125727	-6.1647
Variance	8.89974e-05	2.53921e-06	35.0493

```
ARIMA(1,1,2) Model:
--------------------
Conditional Probability Distribution: Gaussian

                               Standard          t
 Parameter       Value           Error       Statistic
-----------   -----------   ------------   -----------
 Constant    0.000148612   0.000111167         1.33684
    AR{1}       0.746649      0.132966         5.61535
    MA{1}      -0.732007      0.135118        -5.41753
    MA{2}     -0.0609868     0.0226875        -2.68813
 Variance    8.90161e-05   2.53561e-06         35.1064

ARIMA(2,1,2) Model:
--------------------
Conditional Probability Distribution: Gaussian

                               Standard          t
 Parameter       Value           Error       Statistic
-----------   -----------   ------------   -----------
 Constant     0.00023923   0.000126035         1.89812
    AR{1}        1.31209      0.114055          11.504
    AR{2}      -0.740851     0.0871666        -8.49925
    MA{1}       -1.28695      0.123105        -10.4541
    MA{2}       0.687409     0.0957948         7.17585
 Variance    8.87425e-05   2.52803e-06         35.1035

ARIMA(4,1,0) Model:
--------------------
Conditional Probability Distribution: Gaussian

                               Standard          t
 Parameter       Value           Error       Statistic
-----------   -----------   ------------   -----------
 Constant      0.0006686   0.000274536         2.43538
    AR{3}     -0.0629839     0.0222096        -2.83589
    AR{4}     -0.0614709     0.0223005        -2.75648
 Variance    8.86253e-05   2.50313e-06         35.4058

ARIMA(0,1,4) Model:
--------------------
Conditional Probability Distribution: Gaussian

                               Standard          t
 Parameter       Value           Error       Statistic
-----------   -----------   ------------   -----------
 Constant    0.000569214   0.000245826         2.31552
    MA{3}     -0.0644678     0.0226558        -2.84553
    MA{4}     -0.0635488     0.0231999        -2.73918
 Variance    8.88093e-05   2.50972e-06         35.3862

ARIMA(4,1,4) Model:
--------------------
```

Conditional Probability Distribution: Gaussian

Parameter	Value	Standard Error	t Statistic
Constant	0.000146416	4.48184e-05	3.26687
AR{3}	0.190689	0.119548	1.59508
AR{4}	0.579912	0.109864	5.27847
MA{3}	-0.2421	0.115203	-2.10151
MA{4}	-0.634331	0.105668	-6.00307
Variance	8.81666e-05	2.45867e-06	35.8594

3) Analisi dei residui

```
%Valutiamo la qualità del modello specificato analizzando la
 distribuzione dei residui della regressione.
```

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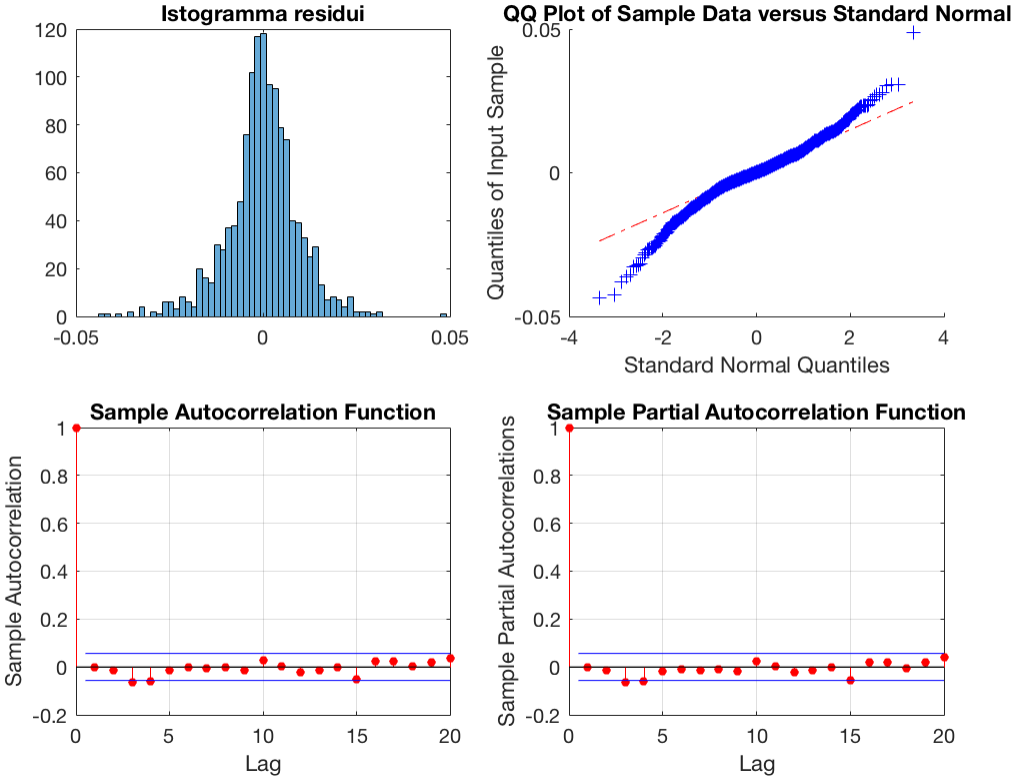
tellus. Donec auctor sit amet eros eu lobortis. Suspendisse potenti. In sed diam vitae felis malesuada dictum. Fusce vehicula lacus mi, vitae ultrices tortor porta a.

ARIMA(1,1,0)

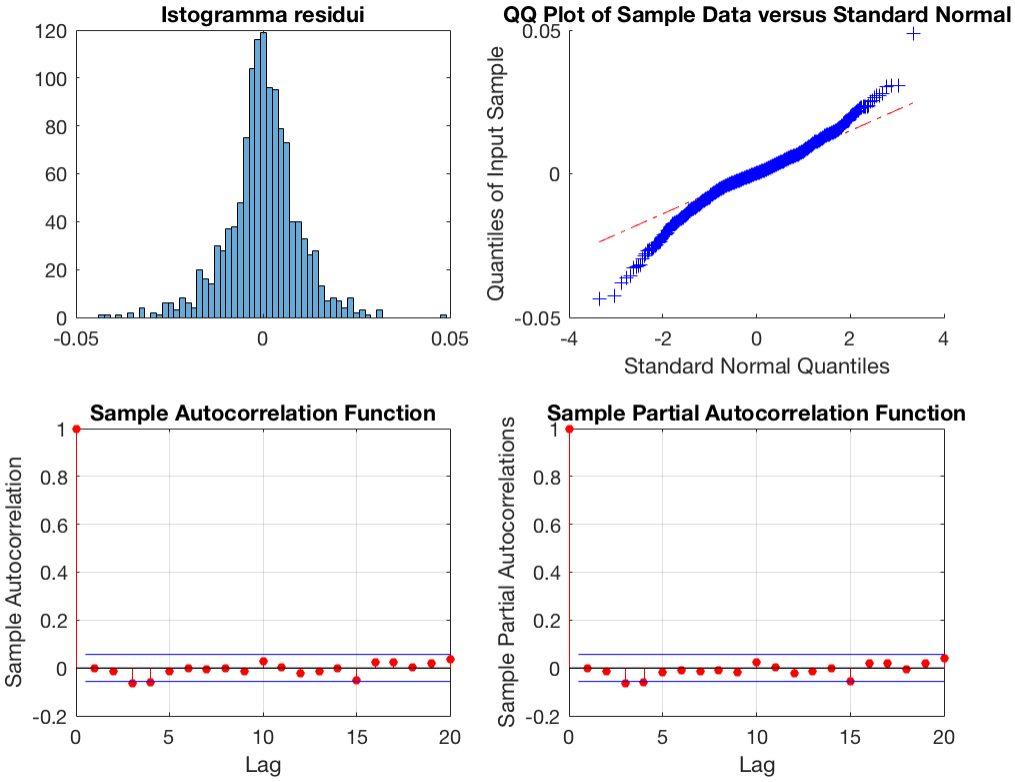
```
figure
subplot(2,2,1)
histogram(res10,60)                    % istogramma dei residui
title('Istogramma residui')
subplot(2,2,2)
qqplot(res10)                          % qqplot dei residui
subplot(2,2,3)
autocorr(res10)                        % correlogramma
subplot(2,2,4)
parcorr(res10)
```



ARIMA(0,1,1)

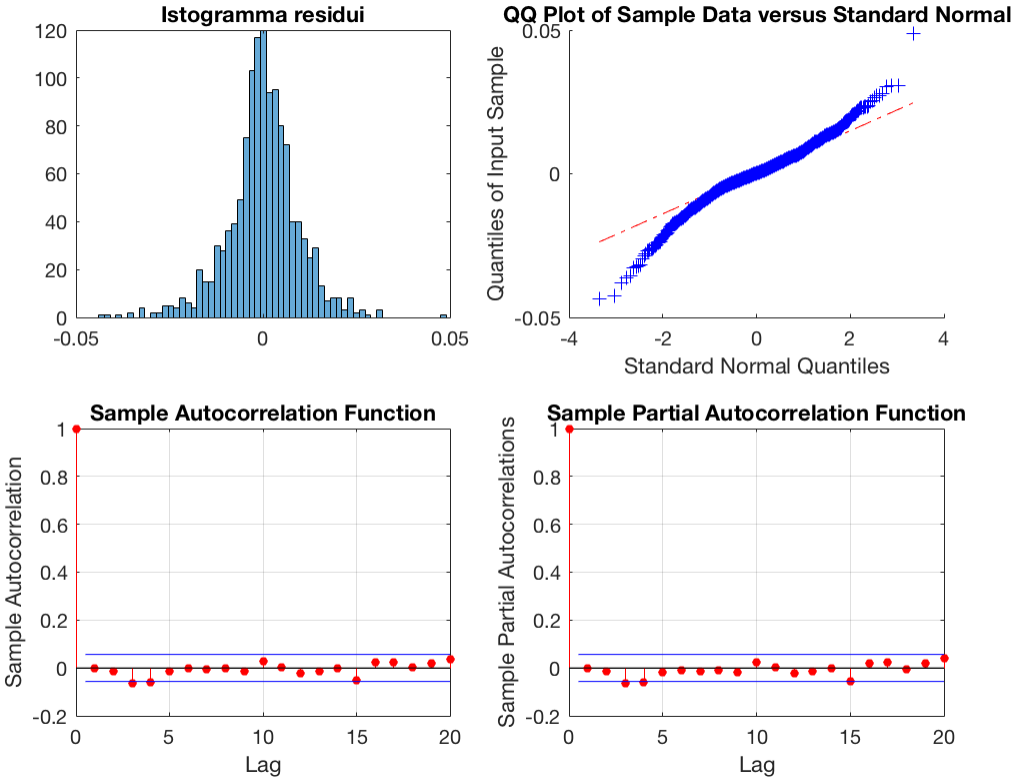
```
figure
subplot(2,2,1)
histogram(res01,60)                    % istogramma dei residui
title('Istogramma residui')
subplot(2,2,2)
qqplot(res01)                          % qqplot dei residui
subplot(2,2,3)
```

```
autocorr(res01)                          % correlogramma
subplot(2,2,4)
parcorr(res01)
```



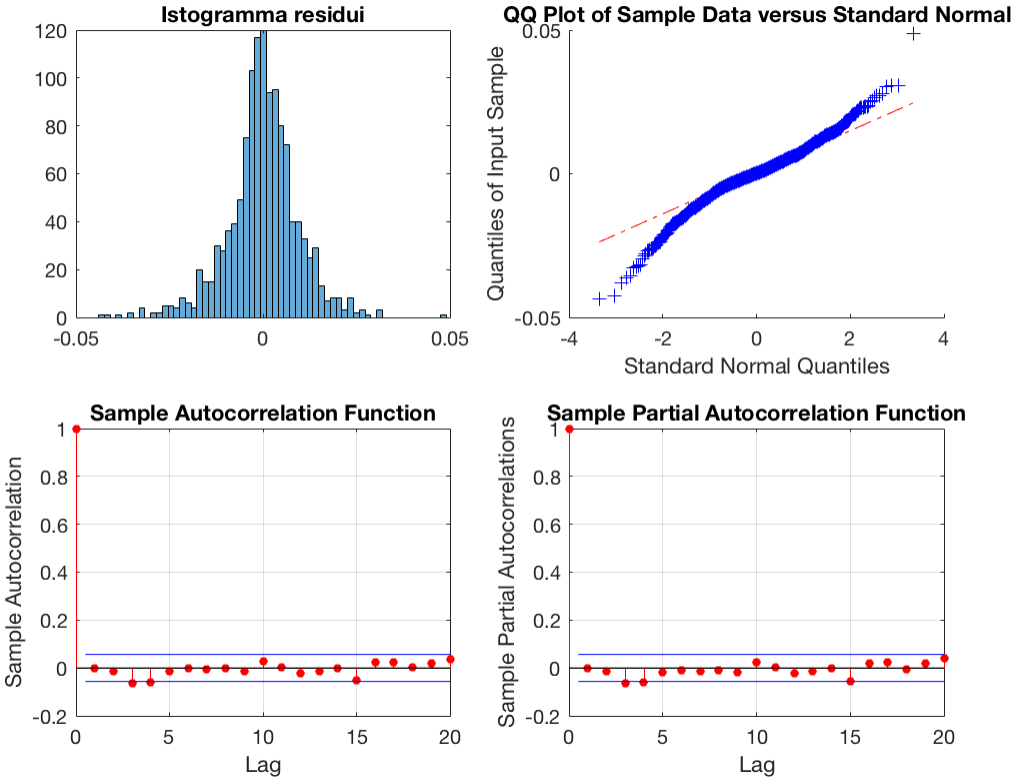
ARIMA(0,1,1)

```
figure
subplot(2,2,1)
histogram(res11,60)                      % istogramma dei residui
title('Istogramma residui')
subplot(2,2,2)
qqplot(res11)                            % qqplot dei residui
subplot(2,2,3)
autocorr(res11)                          % correlogramma
subplot(2,2,4)
parcorr(res11)
```



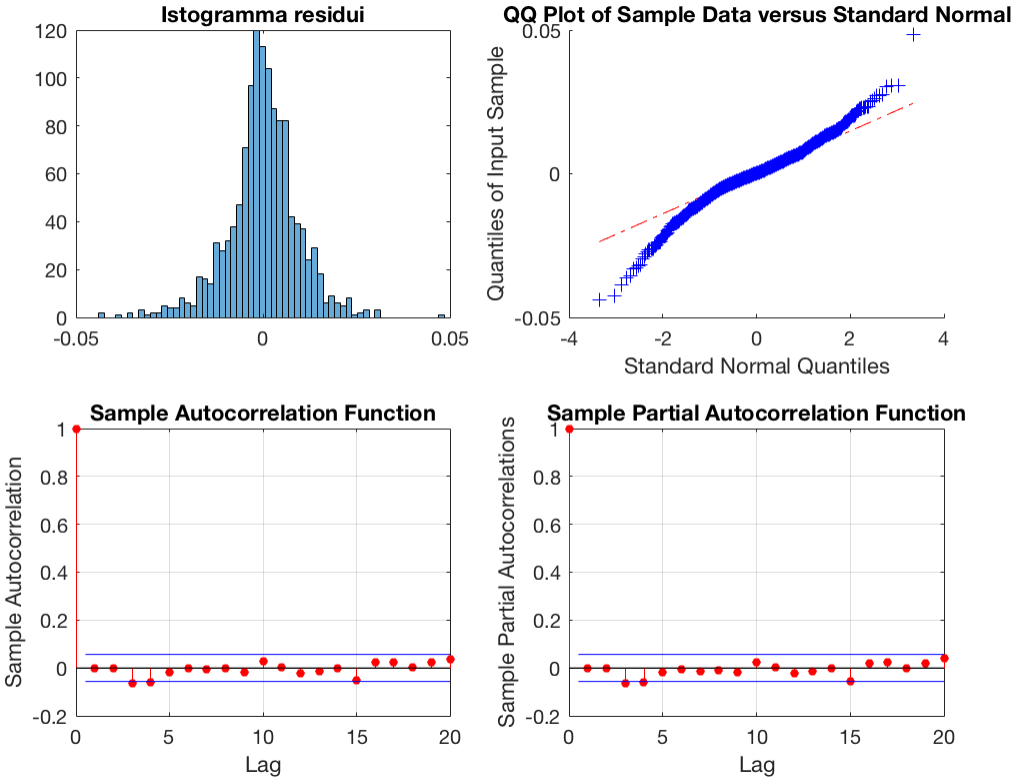
ARIMA(1,1,1)

```
figure
subplot(2,2,1)
histogram(res11,60)                    % istogramma dei residui
title('Istogramma residui')
subplot(2,2,2)
qqplot(res11)                          % qqplot dei residui
subplot(2,2,3)
autocorr(res11)                        % correlogramma
subplot(2,2,4)
parcorr(res11)
```



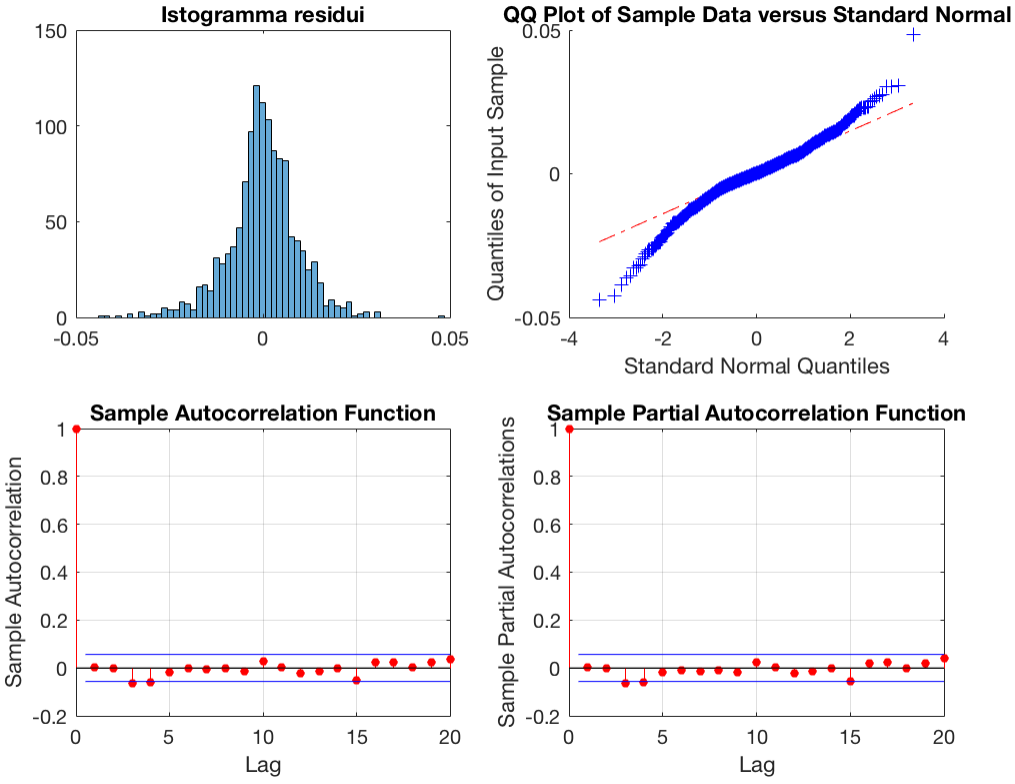
ARIMA(2,1,0)

```
figure
subplot(2,2,1)
histogram(res20,60)                    % istogramma dei residui
title('Istogramma residui')
subplot(2,2,2)
qqplot(res20)                          % qqplot dei residui
subplot(2,2,3)
autocorr(res20)                        % correlogramma
subplot(2,2,4)
parcorr(res20)
```



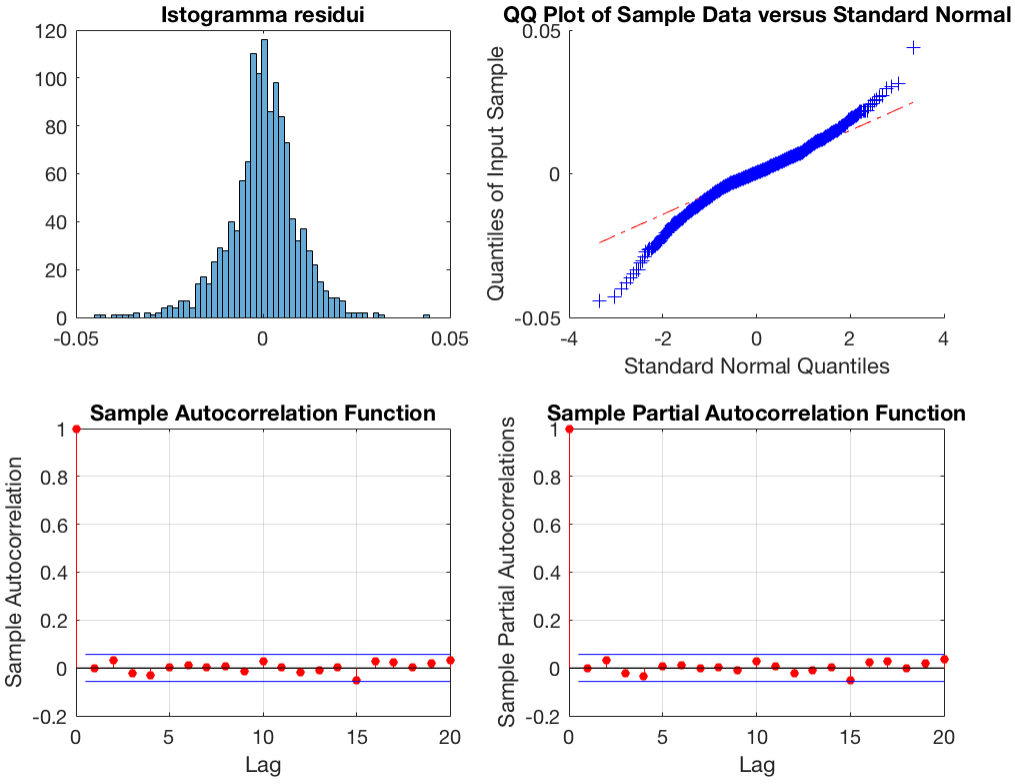
ARIMA(0,1,2)

```
figure
subplot(2,2,1)
histogram(res02,60)                    % istogramma dei residui
title('Istogramma residui')
subplot(2,2,2)
qqplot(res02)                          % qqplot dei residui
subplot(2,2,3)
autocorr(res02)                        % correlogramma
subplot(2,2,4)
parcorr(res02)
```



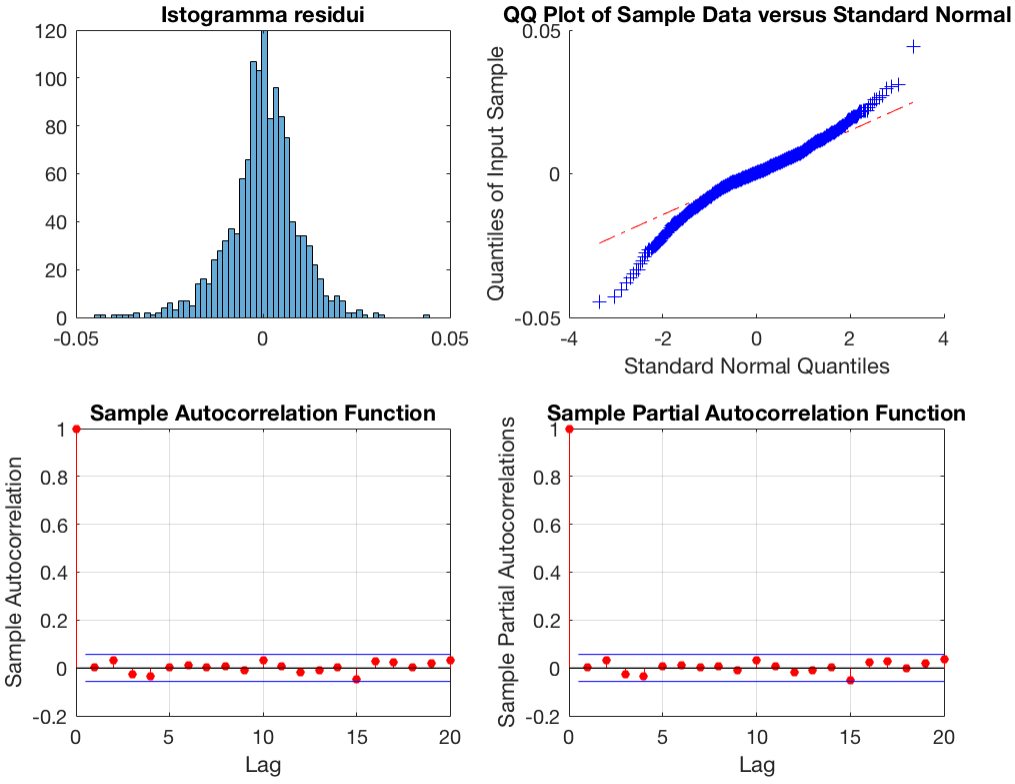
ARIMA(2,1,1)

```
figure
subplot(2,2,1)
histogram(res21,60)                    % istogramma dei residui
title('Istogramma residui')
subplot(2,2,2)
qqplot(res21)                          % qqplot dei residui
subplot(2,2,3)
autocorr(res21)                        % correlogramma
subplot(2,2,4)
parcorr(res21)
```



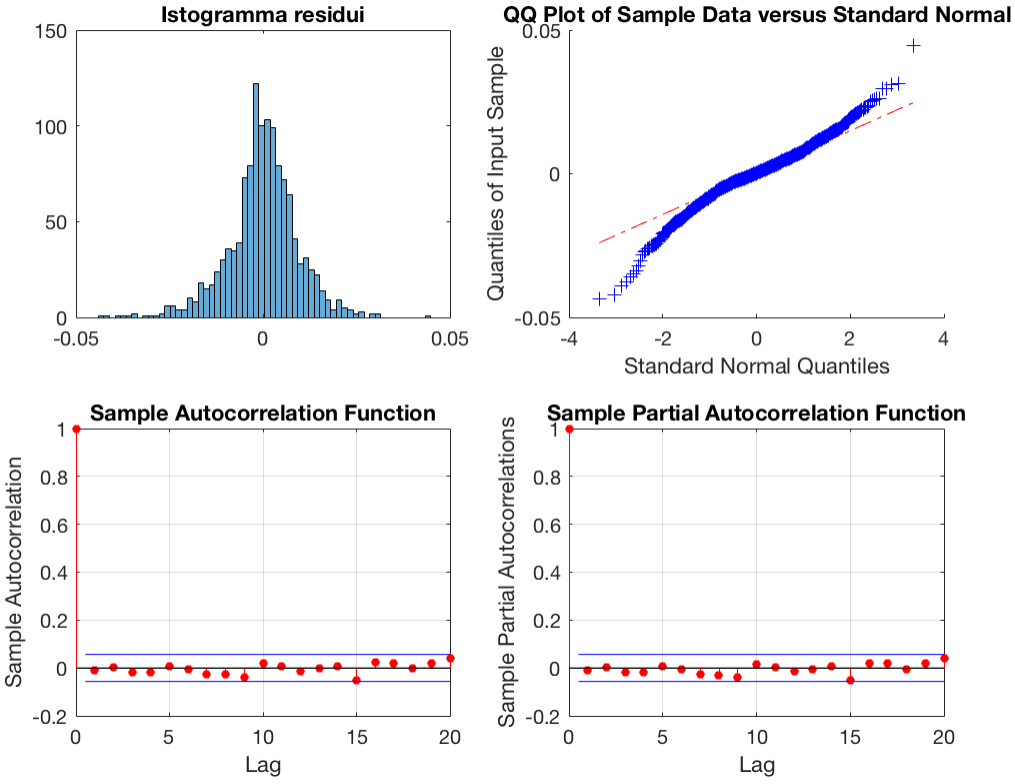
ARIMA(1,1,2)

```
figure
subplot(2,2,1)
histogram(res12,60)                    % istogramma dei residui
title('Istogramma residui')
subplot(2,2,2)
qqplot(res12)                          % qqplot dei residui
subplot(2,2,3)
autocorr(res12)                        % correlogramma
subplot(2,2,4)
parcorr(res12)
```



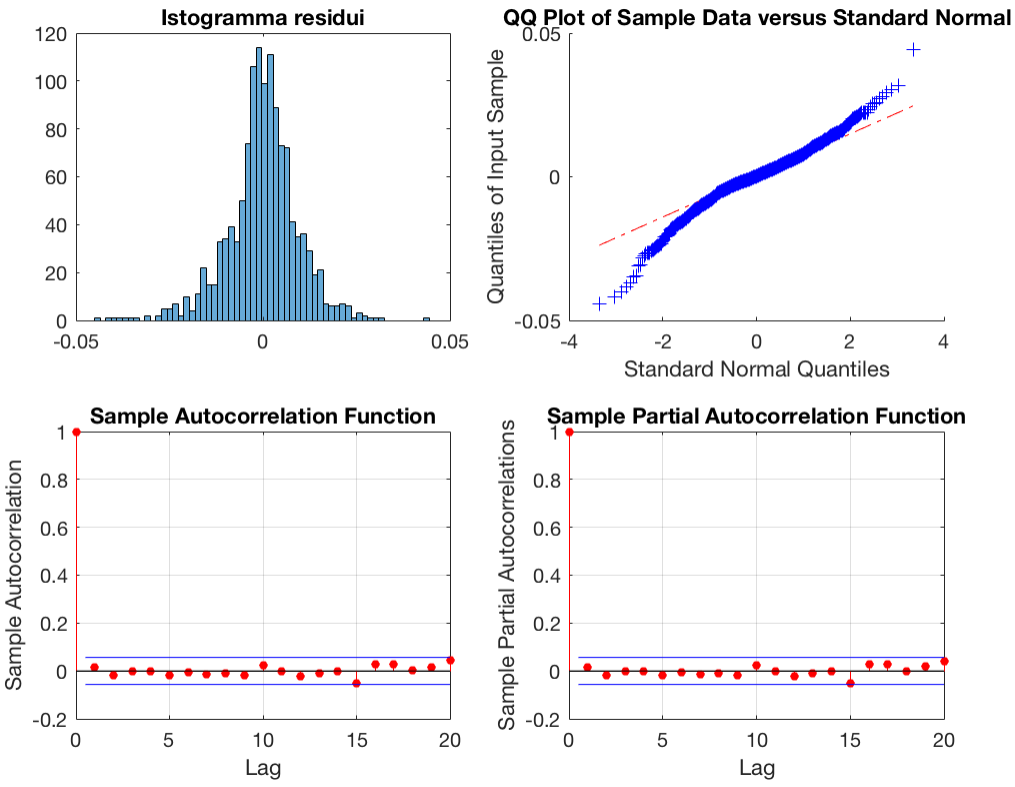
ARIMA(2,1,2)

```
figure
subplot(2,2,1)
histogram(res22,60)                    % istogramma dei residui
title('Istogramma residui')
subplot(2,2,2)
qqplot(res22)                          % qqplot dei residui
subplot(2,2,3)
autocorr(res22)                        % correlogramma
subplot(2,2,4)
parcorr(res22)
```



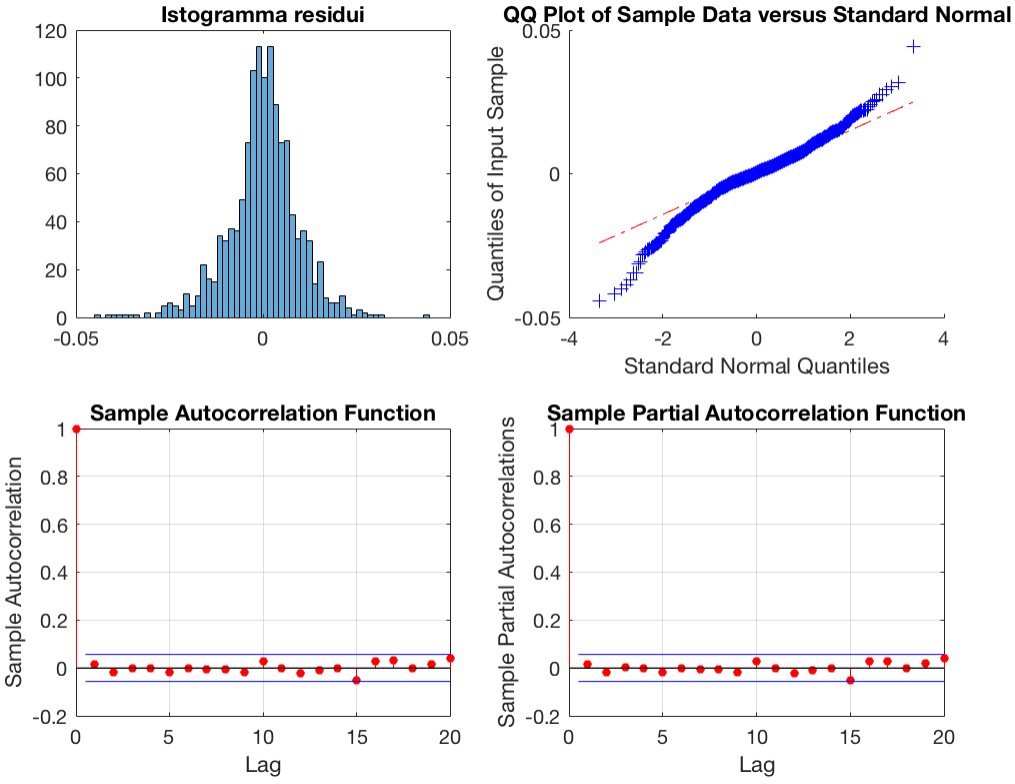
ARIMA(2,1,0) 3-4

```
figure
subplot(2,2,1)
histogram(res340,60)                    % istogramma dei residui
title('Istogramma residui')
subplot(2,2,2)
qqplot(res340)                          % qqplot dei residui
subplot(2,2,3)
autocorr(res340)                        % correlogramma
subplot(2,2,4)
parcorr(res340)
```



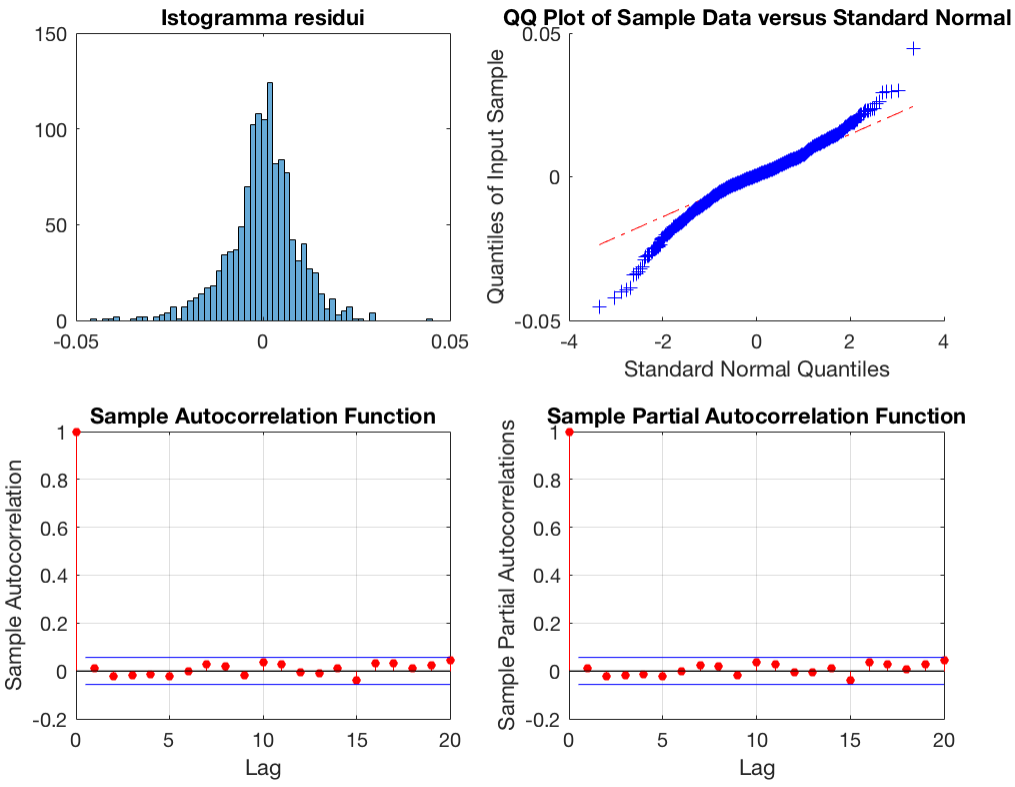
ARIMA(0,1,2) 3-4

```
figure
subplot(2,2,1)
histogram(res034,60)                    % istogramma dei residui
title('Istogramma residui')
subplot(2,2,2)
qqplot(res034)                          % qqplot dei residui
subplot(2,2,3)
autocorr(res034)                        % correlogramma
subplot(2,2,4)
parcorr(res034)
```



ARIMA(2,1,2)

```
figure
subplot(2,2,1)
histogram(res3434,60)                    % istogramma dei residui
title('Istogramma residui')
subplot(2,2,2)
qqplot(res3434)                          % qqplot dei residui
subplot(2,2,3)
autocorr(res3434)                        % correlogramma
subplot(2,2,4)
parcorr(res3434)
```



3) TABELLE

```
%Valutiamo la qualità del modello specificato analizzando la
 distribuzione dei residui della regressione.
```

ARIMA(1,1,0)

```
[h,p,Qstat,crit] = lbqtest(res10,'lags',[1 2 3 4 5 6 7 8 9 10 11 12 13
 14 15 16 17 18 19 20]);
names = {'K';'H';'pvalue';'Qstat';'Crit'};
table(K(2:end),h',p',Qstat',crit','VariableNames',names)        %
 creazione tabella ouput
```

ans =

K	H	pvalue	Qstat	Crit
1	false	0.9904	0.00014481	3.8415
2	false	0.87874	0.25853	5.9915
3	false	0.15932	5.1765	7.8147
4	true	0.042294	9.8916	9.4877
5	false	0.070464	10.174	11.07
6	false	0.11725	10.18	12.592

7	false	0.17588	10.231	14.067
8	false	0.24893	10.235	15.507
9	false	0.30716	10.559	16.919
10	false	0.31955	11.505	18.307
11	false	0.40052	11.523	19.675
12	false	0.44063	12.063	21.026
13	false	0.505	12.278	22.362
14	false	0.58284	12.292	23.685
15	false	0.39882	15.751	24.996
16	false	0.41472	16.558	26.296
17	false	0.43047	17.357	27.587
18	false	0.49745	17.375	28.869
19	false	0.52712	17.93	30.144
20	false	0.48489	19.573	31.41

ARIMA(0,1,1)

```
[h,p,Qstat,crit] = lbqtest(res01,'lags',[1 2 3 4 5 6 7 8 9 10 11 12 13
 14 15 16 17 18 19 20]);
names = {'K';'H';'pvalue';'Qstat';'Crit'};
table(K(2:end),h',p',Qstat',crit','VariableNames',names)        %
 creazione tabella ouput
```

ans =

K	H	pvalue	Qstat	Crit
1	false	0.98508	0.00034993	3.8415
2	false	0.88758	0.23852	5.9915
3	false	0.16153	5.1443	7.8147
4	true	0.043015	9.851	9.4877
5	false	0.071575	10.132	11.07
6	false	0.11891	10.139	12.592
7	false	0.17809	10.189	14.067
8	false	0.2517	10.194	15.507
9	false	0.31019	10.518	16.919
10	false	0.3225	11.464	18.307
11	false	0.40376	11.483	19.675
12	false	0.44405	12.02	21.026
13	false	0.50848	12.235	22.362
14	false	0.58631	12.249	23.685
15	false	0.40168	15.709	24.996
16	false	0.41746	16.518	26.296
17	false	0.43332	17.314	27.587
18	false	0.50037	17.332	28.869
19	false	0.53002	17.887	30.144
20	false	0.48808	19.523	31.41

ARIMA(0,1,1)

```
[h,p,Qstat,crit] = lbqtest(res11,'lags',[1 2 3 4 5 6 7 8 9 10 11 12 13
 14 15 16 17 18 19 20]);
names = {'K';'H';'pvalue';'Qstat';'Crit'};
table(K(2:end),h',p',Qstat',crit','VariableNames',names)        %
 creazione tabella ouput
```

ans =

K	H	pvalue	Qstat	Crit
1	false	0.98187	0.00051658	3.8415
2	false	0.91165	0.18501	5.9915
3	false	0.16396	5.1094	7.8147
4	true	0.043606	9.8181	9.4877
5	false	0.072359	10.103	11.07
6	false	0.12006	10.111	12.592
7	false	0.17959	10.162	14.067
8	false	0.25359	10.166	15.507
9	false	0.31236	10.489	16.919
10	false	0.32474	11.434	18.307
11	false	0.40624	11.452	19.675
12	false	0.44702	11.983	21.026
13	false	0.51133	12.2	22.362
14	false	0.58908	12.215	23.685
15	false	0.40435	15.67	24.996
16	false	0.42012	16.478	26.296
17	false	0.43611	17.272	27.587
18	false	0.50315	17.292	28.869
19	false	0.53246	17.85	30.144
20	false	0.49077	19.481	31.41

ARIMA(1,1,1)

```
[h,p,Qstat,crit] = lbqtest(res11,'lags',[1 2 3 4 5 6 7 8 9 10 11 12 13
 14 15 16 17 18 19 20]);
names = {'K';'H';'pvalue';'Qstat';'Crit'};
table(K(2:end),h',p',Qstat',crit','VariableNames',names)        %
 creazione tabella ouput
```

ans =

K	H	pvalue	Qstat	Crit
1	false	0.98187	0.00051658	3.8415
2	false	0.91165	0.18501	5.9915
3	false	0.16396	5.1094	7.8147

```
 4    true     0.043606        9.8181    9.4877
 5    false    0.072359        10.103     11.07
 6    false     0.12006        10.111    12.592
 7    false     0.17959        10.162    14.067
 8    false     0.25359        10.166    15.507
 9    false     0.31236        10.489    16.919
10    false     0.32474        11.434    18.307
11    false     0.40624        11.452    19.675
12    false     0.44702        11.983    21.026
13    false     0.51133          12.2    22.362
14    false     0.58908        12.215    23.685
15    false     0.40435         15.67    24.996
16    false     0.42012        16.478    26.296
17    false     0.43611        17.272    27.587
18    false     0.50315        17.292    28.869
19    false     0.53246         17.85    30.144
20    false     0.49077        19.481     31.41
```

ARIMA(2,1,0)

```
[h,p,Qstat,crit] = lbqtest(res20,'lags',[1 2 3 4 5 6 7 8 9 10 11 12 13
 14 15 16 17 18 19 20]);
names = {'K';'H';'pvalue';'Qstat';'Crit'};
table(K(2:end),h',p',Qstat',crit','VariableNames',names)        %
 creazione tabella ouput


ans =

    K       H       pvalue       Qstat       Crit
    __    _____    _________    _________    _____

     1    false      0.97013    0.0014024    3.8415
     2    false      0.99906     0.001886    5.9915
     3    false      0.17888        4.905    7.8147
     4    true      0.046548       9.6607    9.4877
     5    false     0.075643       9.9856     11.07
     6    false      0.12465           10    12.592
     7    false      0.18528       10.059    14.067
     8    false      0.26076       10.061    15.507
     9    false      0.31997       10.388    16.919
    10    false      0.33387        11.31    18.307
    11    false      0.41652       11.324    19.675
    12    false      0.45805       11.847    21.026
    13    false      0.52046       12.088    22.362
    14    false      0.59819       12.101    23.685
    15    false      0.41326        15.54    24.996
    16    false       0.4288        16.35    26.296
    17    false      0.44643       17.118    27.587
    18    false      0.51304       17.147    28.869
    19    false      0.53852        17.76    30.144
    20    false      0.50054       19.329     31.41
```

ARIMA(0,1,2)

```
[h,p,Qstat,crit] = lbqtest(res02,'lags',[1 2 3 4 5 6 7 8 9 10 11 12 13
 14 15 16 17 18 19 20]);
names = {'K';'H';'pvalue';'Qstat';'Crit'};
table(K(2:end),h',p',Qstat',crit','VariableNames',names)        %
 creazione tabella ouput
```

```
ans =
```

K	H	pvalue	Qstat	Crit
1	false	0.97479	0.00099842	3.8415
2	false	0.99937	0.0012526	5.9915
3	false	0.17057	5.0169	7.8147
4	true	0.0447	9.7584	9.4877
5	false	0.072865	10.085	11.07
6	false	0.12057	10.098	12.592
7	false	0.17988	10.156	14.067
8	false	0.25402	10.159	15.507
9	false	0.31281	10.483	16.919
10	false	0.32678	11.406	18.307
11	false	0.40874	11.42	19.675
12	false	0.45047	11.94	21.026
13	false	0.51286	12.181	22.362
14	false	0.59057	12.196	23.685
15	false	0.40725	15.627	24.996
16	false	0.42315	16.433	26.296
17	false	0.44049	17.206	27.587
18	false	0.50697	17.235	28.869
19	false	0.53264	17.848	30.144
20	false	0.49381	19.434	31.41

ARIMA(2,1,1)

```
[h,p,Qstat,crit] = lbqtest(res21,'lags',[1 2 3 4 5 6 7 8 9 10 11 12 13
 14 15 16 17 18 19 20]);
names = {'K';'H';'pvalue';'Qstat';'Crit'};
table(K(2:end),h',p',Qstat',crit','VariableNames',names)        %
 creazione tabella ouput
```

```
ans =
```

K	H	pvalue	Qstat	Crit
1	false	0.96168	0.0023085	3.8415

2	false	0.51161	1.3404	5.9915
3	false	0.55618	2.079	7.8147
4	false	0.49995	3.357	9.4877
5	false	0.64163	3.3799	11.07
6	false	0.74464	3.495	12.592
7	false	0.83524	3.4999	14.067
8	false	0.89652	3.5342	15.507
9	false	0.92807	3.7334	16.919
10	false	0.9032	4.8148	18.307
11	false	0.9385	4.8438	19.675
12	false	0.94763	5.2888	21.026
13	false	0.96384	5.4523	22.362
14	false	0.97845	5.4534	23.685
15	false	0.89578	8.6357	24.996
16	false	0.88916	9.5476	26.296
17	false	0.89063	10.298	27.587
18	false	0.92098	10.32	28.869
19	false	0.92793	10.876	30.144
20	false	0.90804	12.227	31.41

ARIMA(1,1,2)

```
[h,p,Qstat,crit] = lbqtest(res12,'lags',[1 2 3 4 5 6 7 8 9 10 11 12 13
 14 15 16 17 18 19 20]);
names = {'K';'H';'pvalue';'Qstat';'Crit'};
table(K(2:end),h',p',Qstat',crit','VariableNames',names)        %
 creazione tabella ouput
```

ans =

K	H	pvalue	Qstat	Crit
1	false	0.92913	0.0079095	3.8415
2	false	0.5343	1.2536	5.9915
3	false	0.51994	2.2615	7.8147
4	false	0.44947	3.6907	9.4877
5	false	0.5919	3.7098	11.07
6	false	0.69754	3.8458	12.592
7	false	0.79581	3.8595	14.067
8	false	0.86474	3.9146	15.507
9	false	0.90713	4.0643	16.919
10	false	0.87387	5.2499	18.307
11	false	0.91594	5.2969	19.675
12	false	0.93114	5.6845	21.026
13	false	0.95215	5.8291	22.362
14	false	0.97058	5.8305	23.685
15	false	0.88066	8.9395	24.996
16	false	0.87384	9.8599	26.296
17	false	0.87534	10.626	27.587
18	false	0.90856	10.651	28.869

```
    19    false    0.91618       11.221    30.144
    20    false    0.89449       12.584     31.41
```

ARIMA(2,1,2)

```
[h,p,Qstat,crit] = lbqtest(res22,'lags',[1 2 3 4 5 6 7 8 9 10 11 12 13
 14 15 16 17 18 19 20]);
names = {'K';'H';'pvalue';'Qstat';'Crit'};
table(K(2:end),h',p',Qstat',crit','VariableNames',names)        %
 creazione tabella ouput
```

```
ans =

    K       H      pvalue      Qstat       Crit
    __    _____    _______    ________    ______

     1    false    0.76803    0.086994    3.8415
     2    false    0.94945     0.10374    5.9915
     3    false    0.89462      0.6079    7.8147
     4    false    0.90527      1.0297    9.4877
     5    false    0.95117      1.1327     11.07
     6    false    0.97925      1.1507    12.592
     7    false    0.95696      2.0511    14.067
     8    false    0.93041       3.062    15.507
     9    false    0.84282      4.9014    16.919
    10    false     0.8696      5.3091    18.307
    11    false     0.9128      5.3544    19.675
    12    false     0.9369      5.5534    21.026
    13    false     0.9605      5.5671    22.362
    14    false    0.97527      5.6158    23.685
    15    false    0.88968       8.761    24.996
    16    false    0.89178      9.4921    26.296
    17    false    0.90465      9.9751    27.587
    18    false    0.93227      9.9889    28.869
    19    false    0.94146      10.432    30.144
    20    false     0.9017      12.398     31.41
```

ARIMA(4,1,0)

```
[h,p,Qstat,crit] = lbqtest(res340,'lags',[1 2 3 4 5 6 7 8 9 10 11 12
 13 14 15 16 17 18 19 20]);
names = {'K';'H';'pvalue';'Qstat';'Crit'};
table(K(2:end),h',p',Qstat',crit','VariableNames',names)        %
 creazione tabella ouput
```

```
ans =

    K       H      pvalue      Qstat       Crit
    __    _____    _______    ________    ______
```

1	false	0.54451	0.36724	3.8415
2	false	0.70114	0.71009	5.9915
3	false	0.87022	0.71267	7.8147
4	false	0.94946	0.71503	9.4877
5	false	0.95315	1.1107	11.07
6	false	0.97783	1.1806	12.592
7	false	0.98608	1.3833	14.067
8	false	0.99312	1.4746	15.507
9	false	0.99244	1.9363	16.919
10	false	0.98639	2.767	18.307
11	false	0.99346	2.767	19.675
12	false	0.99068	3.5155	21.026
13	false	0.99441	3.6458	22.362
14	false	0.99724	3.6472	23.685
15	false	0.95591	7.0618	24.996
16	false	0.95032	7.9509	26.296
17	false	0.93725	9.0945	27.587
18	false	0.95749	9.0955	28.869
19	false	0.9651	9.4569	30.144
20	false	0.92378	11.77	31.41

ARIMA(0,1,4)

```
[h,p,Qstat,crit] = lbqtest(res034,'lags',[1 2 3 4 5 6 7 8 9 10 11 12
 13 14 15 16 17 18 19 20]);
names = {'K';'H';'pvalue';'Qstat';'Crit'};
table(K(2:end),h',p',Qstat',crit','VariableNames',names)        %
 creazione tabella ouput
```

```
ans =
```

K	H	pvalue	Qstat	Crit
1	false	0.55337	0.35132	3.8415
2	false	0.70408	0.70173	5.9915
3	false	0.87275	0.70195	7.8147
4	false	0.95102	0.70246	9.4877
5	false	0.95309	1.1114	11.07
6	false	0.98037	1.1262	12.592
7	false	0.99194	1.1546	14.067
8	false	0.99679	1.185	15.507
9	false	0.99595	1.642	16.919
10	false	0.991	2.4917	18.307
11	false	0.99589	2.4917	19.675
12	false	0.99377	3.2215	21.026
13	false	0.99644	3.3331	22.362
14	false	0.99832	3.3344	23.685
15	false	0.96293	6.8014	24.996
16	false	0.95791	7.677	26.296

```
    17    false    0.94478     8.8523    27.587
    18    false    0.96306     8.8526    28.869
    19    false    0.97052     9.1718    30.144
    20    false    0.93389     11.444     31.41
```

ARIMA(4,1,4)

```
[h,p,Qstat,crit] = lbqtest(res3434,'lags',[1 2 3 4 5 6 7 8 9 10 11 12
 13 14 15 16 17 18 19 20]);
names = {'K';'H';'pvalue';'Qstat';'Crit'};
table(K(2:end),h',p',Qstat',crit','VariableNames',names)        %
 creazione tabella ouput
```

```
ans =

    K       H      pvalue      Qstat      Crit
    __    _____    _______    _______    _____

     1    false    0.68973    0.15937    3.8415
     2    false    0.67747    0.77879    5.9915
     3    false    0.74187     1.2465    7.8147
     4    false    0.81839     1.5464    9.4877
     5    false    0.81573     2.2352     11.07
     6    false    0.89685     2.2352    12.592
     7    false    0.87229     3.1344    14.067
     8    false    0.88442     3.6843    15.507
     9    false    0.89823     4.1933    16.919
    10    false    0.82851     5.8401    18.307
    11    false    0.81537     6.7959    19.675
    12    false    0.86686      6.858    21.026
    13    false    0.90516     6.9412    22.362
    14    false    0.93282     7.0487    23.685
    15    false    0.88561     8.8424    24.996
    16    false    0.85498     10.218    26.296
    17    false    0.82983     11.493    27.587
    18    false    0.86364     11.673    28.869
    19    false    0.86259     12.512    30.144
    20    false    0.78291     14.886     31.41
```

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