

Série de TD N°3

Exercice 01 :

On vous donne les informations consignées dans les figures et tableaux ci après :
Figure 1 : Le correlogramme de la série OILP stationarisé (en première différence)

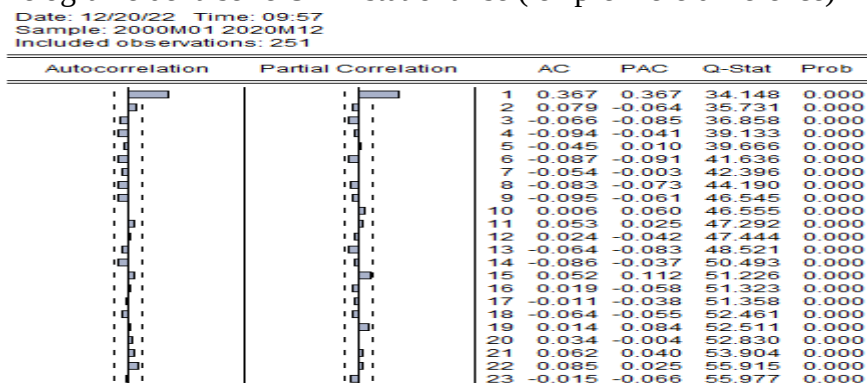


Tableau 01 : Les résultats de la régression de D(OILP) sur AR(1)

Dependent Variable: D(OILP)				
Method: ARMA Maximum Likelihood (OPG - BHHH)				
Date: 12/15/22 Time: 12:23				
Sample: 2000M02 2020M12				
Included observations: 251				
Convergence achieved after 18 iterations				
Coefficient covariance computed using outer product of gradients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.119327	0.612170	0.194925	0.8456
AR(1)	0.367580	0.042051	8.741362	0.0000
SIGMASQ	30.01016	2.053149	14.61665	0.0000
R-squared	0.135312	Mean dependent var		0.097649
Adjusted R-squared	0.128339	S.D. dependent var		5.902981
S.E. of regression	5.511187	Akaike info criterion		6.263896
Sum squared resid	7532.550	Schwarz criterion		6.306033
Log likelihood	-783.1189	Hannan-Quinn criter.		6.280853
F-statistic	19.40437	Durbin-Watson stat		1.944302
Prob(F-statistic)	0.000000			
Inverted AR Roots	.37			

La figure 2 : Le correlogramme des residus de l'estimation du processus AR(1)

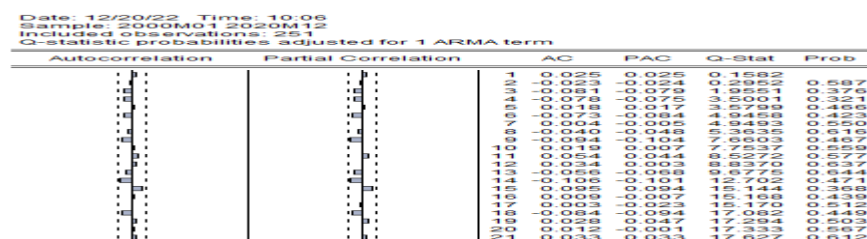


Tableau 02 : Les résultats de la régression de D(OILP) sur MA(1)

Dependent Variable: D(OILP)				
Method: ARMA Maximum Likelihood (OPG - BHHH)				
Date: 12/15/22 Time: 12:24				
Sample: 2000M02 2020M12				
Included observations: 251				
Convergence achieved after 7 iterations				
Coefficient covariance computed using outer product of gradients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.108747	0.528278	0.205852	0.8371
MA(1)	0.347391	0.054531	6.370497	0.0000
SIGMASQ	30.26075	2.071012	14.61158	0.0000
R-squared	0.128092	Mean dependent var		0.097649
Adjusted R-squared	0.121060	S.D. dependent var		5.902981
S.E. of regression	5.534149	Akaike info criterion		6.272145
Sum squared resid	7595.449	Schwarz criterion		6.314282
Log likelihood	-784.1542	Hannan-Quinn criter.		6.289102
F-statistic	18.21683	Durbin-Watson stat		1.916854
Prob(F-statistic)	0.000000			
Inverted MA Roots	-.35			

Tableau 3 : Les résultats de la régression de D(OILP) sur AR(1) et MA (1)

Dependent Variable: D(OILP)				
Method: ARMA Maximum Likelihood (OPG - BHHH)				
Date: 12/20/22 Time: 10:03				
Sample: 2000M02 2020M12				
Included observations: 251				
Convergence achieved after 25 iterations				
Coefficient covariance computed using outer product of gradients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.116527	0.590111	0.197466	0.8436
AR(1)	0.264636	0.106653	2.481275	0.0138
MA(1)	0.120587	0.132302	0.911452	0.3629
SIGMASQ	29.92371	2.062107	14.51123	0.0000
R-squared	0.137803	Mean dependent var		0.097649
Adjusted R-squared	0.127331	S.D. dependent var		5.902981
S.E. of regression	5.514372	Akaike info criterion		6.268998
Sum squared resid	7510.850	Schwarz criterion		6.325181
Log likelihood	-782.7593	Hannan-Quinn criter.		6.291608
F-statistic	13.15919	Durbin-Watson stat		1.986549
Prob(F-statistic)	0.000000			
Inverted AR Roots	.26			
Inverted MA Roots	-.12			

Travail à faire :

- 1) Le processus est-il un AR(1) ?
- 2) Le processus est-il un MA(1) ?
- 3) Le processus est-il un ARMA(1) ?

Exercice 2 : On vous donne les informations consignées dans les figures et tableaux ci après

Figure 1 : Correlograme de la variable D(PPT)

Date: 01/01/08 Time: 01:00

Sample: 2015M01 2020M12

Included observations: 71

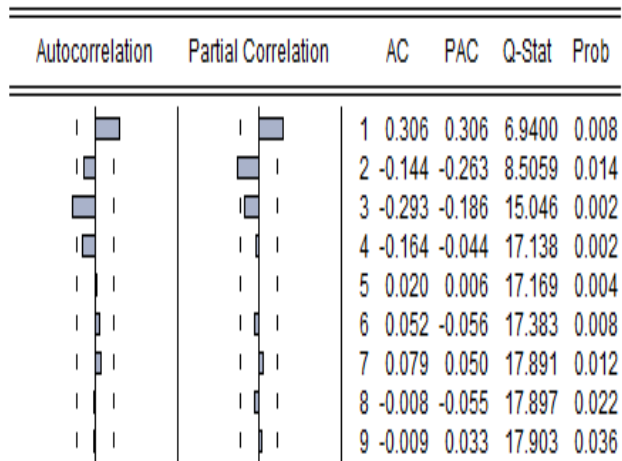


Tableau (1) : Résultats de la régression de D(PPT) sur AR(1) et AR(2)

Dependent Variable: D(PPT)

Method: ARMA Maximum Likelihood (OPG - BHHH)

Date: 01/01/08 Time: 01:03

Sample: 2015M02 2020M12

Included observations: 71

Convergence achieved after 13 iterations

Coefficient covariance computed using outer product of gradients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.068251	0.884700	0.077146	0.9387
AR(1)	0.418309	0.142088	2.944009	0.0044
AR(2)	-0.286603	0.119968	-2.389007	0.0197
SIGMASQ	28.95731	3.756708	7.708160	0.0000
R-squared	0.172603	Mean dependent var	0.031549	

Tableau (2) : Résultats de la régression de D(PPT) sur MA(1) et MA(3)

Dependent Variable: D(PPT)

Method: ARMA Maximum Likelihood (OPG - BHHH)

Date: 01/01/08 Time: 01:07

Sample: 2015M02 2020M12

Included observations: 71

Convergence achieved after 22 iterations

Coefficient covariance computed using outer product of gradients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.055933	0.844279	0.066250	0.9474
MA(1)	0.347107	0.139792	2.483019	0.0155
MA(3)	-0.212756	0.155744	-1.366060	0.1765
SIGMASQ	29.11079	3.646131	7.984023	0.0000
R-squared	0.168218	Mean dependent var	0.031549	

Tableau (3) : Estimation du processus ARMA

Dependent Variable: D(PPT)

Method: ARMA Maximum Likelihood (OPG - BHHH)

Date: 01/01/08 Time: 01:09

Sample: 2015M02 2020M12

Included observations: 71

Convergence achieved after 28 iterations

Coefficient covariance computed using outer product of gradients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.011843	0.684955	-0.017291	0.9863
AR(1)	0.862099	0.409370	2.105917	0.0390
AR(2)	-0.434040	0.174029	-2.494070	0.0151
MA(1)	-0.503258	0.426849	-1.179007	0.2426
SIGMASQ	28.09473	3.784021	7.424569	0.0000
R-squared	0.197250	Mean dependent var	0.031549	
Adjusted R-squared	0.148598	S.D. dependent var	5.958025	

Figure 2 : Correlograme des résidus d'estimation ARMA(2,1)

Date: 01/01/08 Time: 01:10

Sample: 2015M01 2020M12

Included observations: 71

Q-statistic probabilities adjusted for 3 ARMA terms

Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob
		1	-0.017	-0.017	0.0205
		2	0.037	0.037	0.1255
		3	-0.035	-0.034	0.2211
		4	-0.016	-0.019	0.2413
		5	0.060	0.063	0.5287
		6	-0.056	-0.055	0.7803
		7	0.039	0.032	0.9034
		8	-0.086	-0.078	1.5135
		9	-0.023	-0.029	1.5571

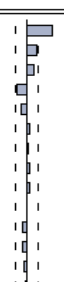
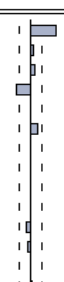
Travail à faire :

- Commenter les résultats de la figure 1
- Le processus est-il un AR(1), AR(2) ?
- Le processus est-il un MA(1), MA(2) ?
- Le processus est-il un ARIMA(2,1) ?

Exercice 3 : commenter les résultats suivants :

Correlogramme de la variable D(ERM)

Date: 01/01/08 Time: 00:25
Sample: 2008M01 2022M09
Included observations: 176

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.318	0.318	18.139	0.000
		2	0.126	0.027	20.993	0.000
		3	0.088	0.045	22.408	0.000
		4	-0.117	-0.179	24.895	0.000
		5	-0.081	-0.001	26.098	0.000
		6	0.036	0.089	26.330	0.000
		7	0.009	0.002	26.344	0.000
		8	0.028	0.001	26.488	0.001
		9	0.035	-0.005	26.713	0.002
		10	-0.001	0.002	26.713	0.003
		11	-0.055	-0.056	27.287	0.004
		12	-0.063	-0.036	28.043	0.005
		13	-0.046	-0.003	28.443	0.008
		14	-0.023	0.010	28.543	0.012

Régression de D(ERM) sur AR(1)

Dependent Variable: D(ERM)
Method: ARMA Maximum Likelihood (OPG - BHHH)
Date: 01/01/08 Time: 00:28
Sample: 2008M02 2022M09
Included observations: 176
Convergence achieved after 11 iterations
Coefficient covariance computed using outer product of gradients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.418245	0.149528	2.797097	0.0057
AR(1)	0.316799	0.062151	5.097228	0.0000
SIGMASQ	1.501058	0.086188	17.41616	0.0000

R-squared 0.101411 Mean dependent var 0.419758

Correlogramme des résidus d'estimation AR(1)

Date: 01/01/08 Time: 00:29
Sample: 2008M01 2022M09
Included observations: 176
Q-statistic probabilities adjusted for 1 ARMA term

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.007	-0.007	0.0099	
		2	0.011	0.011	0.0324	0.857
		3	0.105	0.105	2.0293	0.363
		4	-0.146	-0.146	5.9038	0.116
		5	-0.071	-0.076	6.8150	0.146
		6	0.069	0.064	7.6887	0.174
		7	-0.012	0.022	7.7154	0.260
		8	0.019	0.010	7.7824	0.352
		9	0.033	-0.002	7.9929	0.434
		10	0.006	0.019	7.9989	0.534
		11	-0.045	-0.039	8.3814	0.592
		12	-0.041	-0.047	8.7085	0.649

Régression de D(ERM) sur AR(1) AR(4)

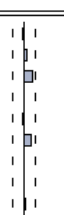
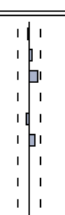
Dependent Variable: D(ERM)
Method: ARMA Maximum Likelihood (OPG - BHHH)
Date: 01/01/08 Time: 00:40
Sample: 2008M02 2022M09
Included observations: 176
Convergence achieved after 12 iterations
Coefficient covariance computed using outer product of gradients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.431087	0.132883	3.244116	0.0014
AR(1)	0.330542	0.063573	5.199421	0.0000
AR(4)	-0.163628	0.064732	-2.527783	0.0124
SIGMASQ	1.460616	0.096976	15.06165	0.0000

R-squared 0.125621 Mean dependent var 0.419758

Correlogramme des résidus d'estimation AR(1)

Date: 01/01/08 Time: 00:41
Sample: 2008M01 2022M09
Included observations: 176
Q-statistic probabilities adjusted for 2 ARMA terms

Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob
		1 -0.013	-0.013	0.0311	
		2 0.029	0.029	0.1808	
		3 0.111	0.112	2.4043	0.121
		4 -0.001	0.002	2.4044	0.301
		5 -0.022	-0.029	2.4948	0.476
		6 0.090	0.078	3.9905	0.407
		7 -0.001	0.003	3.9907	0.551
		8 0.002	0.003	3.9918	0.678
		9 0.016	-0.002	4.0390	0.775
		10 0.012	0.012	4.0664	0.851

Régression de D(ERM) sur MA(1)

Dependent Variable: D(ERM)
Method: ARMA Maximum Likelihood (OPG - BHHH)
Date: 01/01/08 Time: 00:34
Sample: 2008M02 2022M09
Included observations: 176
Convergence achieved after 14 iterations
Coefficient covariance computed using outer product of gradients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.422144	0.133759	3.155995	0.0019
MA(1)	0.306895	0.064962	4.724230	0.0000
SIGMASQ	1.513961	0.096471	15.69342	0.0000

R-squared 0.093686 Mean dependent var 0.419758
Adjusted R-squared 0.083209 S.D. dependent var 1.296150
S.E. of regression 1.241054 Akaike info criterion 3.287260
Sum squared resid 266.4572 Schwarz criterion 3.341302
Log likelihood -286.2788 Hannan-Quinn criter. 3.309179
F-statistic 8.941567 Durbin-Watson stat 1.958680
Prob(F-statistic) 0.000202

Inverted MA Roots - .31

Régression de D(ERM) sur MA(1) et Ma(2)

Dependent Variable: D(ERM)
Method: ARMA Maximum Likelihood (OPG - BHHH)
Date: 01/01/08 Time: 00:35
Sample: 2008M02 2022M09
Included observations: 176
Convergence achieved after 28 iterations
Coefficient covariance computed using outer product of gradients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.420673	0.140955	2.984447	0.0033
MA(1)	0.302493	0.066147	4.573027	0.0000
MA(2)	0.057293	0.073802	0.776299	0.4386
SIGMASQ	1.509993	0.099286	15.20858	0.0000

R-squared 0.096062 Mean dependent var 0.419758

Figure 2 : Estimation ARMA(1,1)

Dependent Variable: D(ERM)
Method: ARMA Maximum Likelihood (OPG - BHHH)
Date: 01/01/08 Time: 00:36
Sample: 2008M02 2022M09
Included observations: 176
Convergence achieved after 14 iterations
Coefficient covariance computed using outer product of gradients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.415637	0.160509	2.589499	0.0104
AR(1)	0.417268	0.262889	1.587239	0.1143
MA(1)	-0.111814	0.276390	-0.404552	0.6863
SIGMASQ	1.499374	0.090134	16.63488	0.0000

R-squared 0.102419 Mean dependent var 0.419758

