

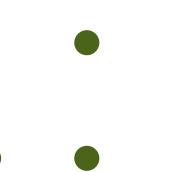
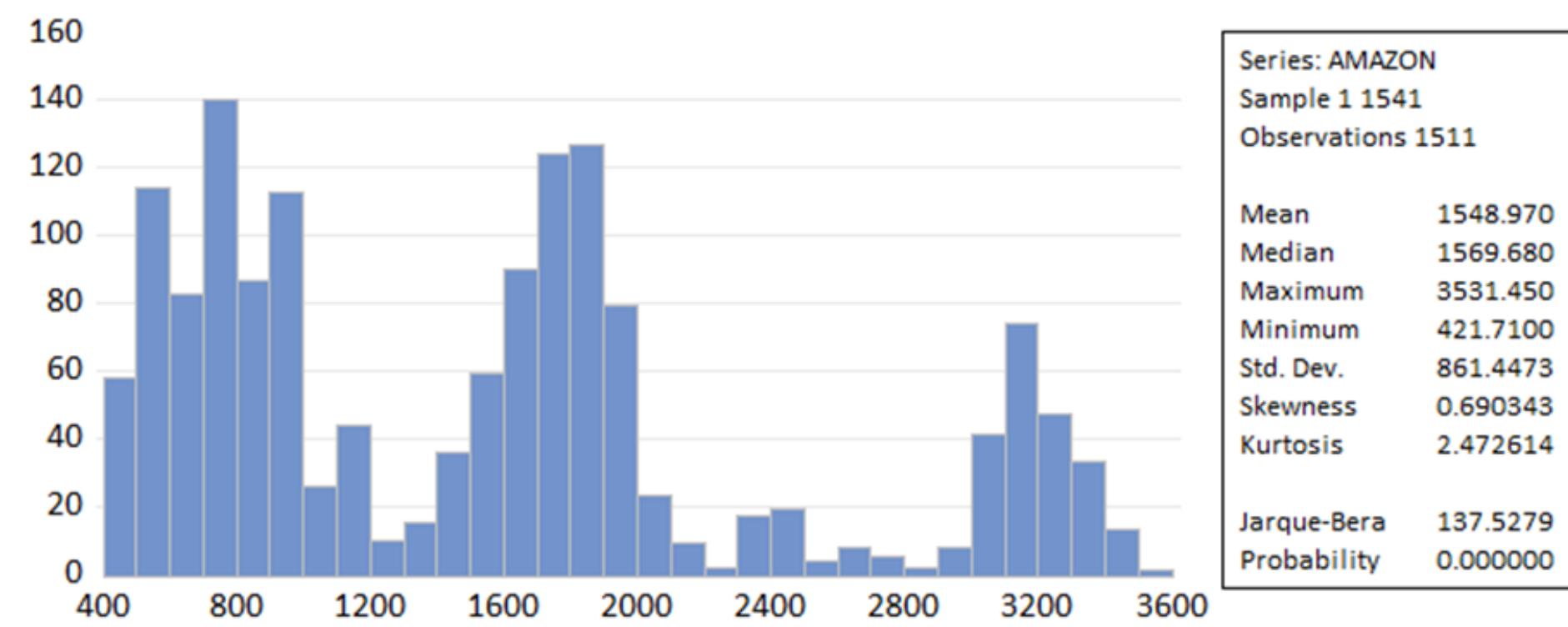
Analiza prețului de închidere a acțiunilor Amazon, Apple și Microsoft pentru anii 2015-2021

Studenti

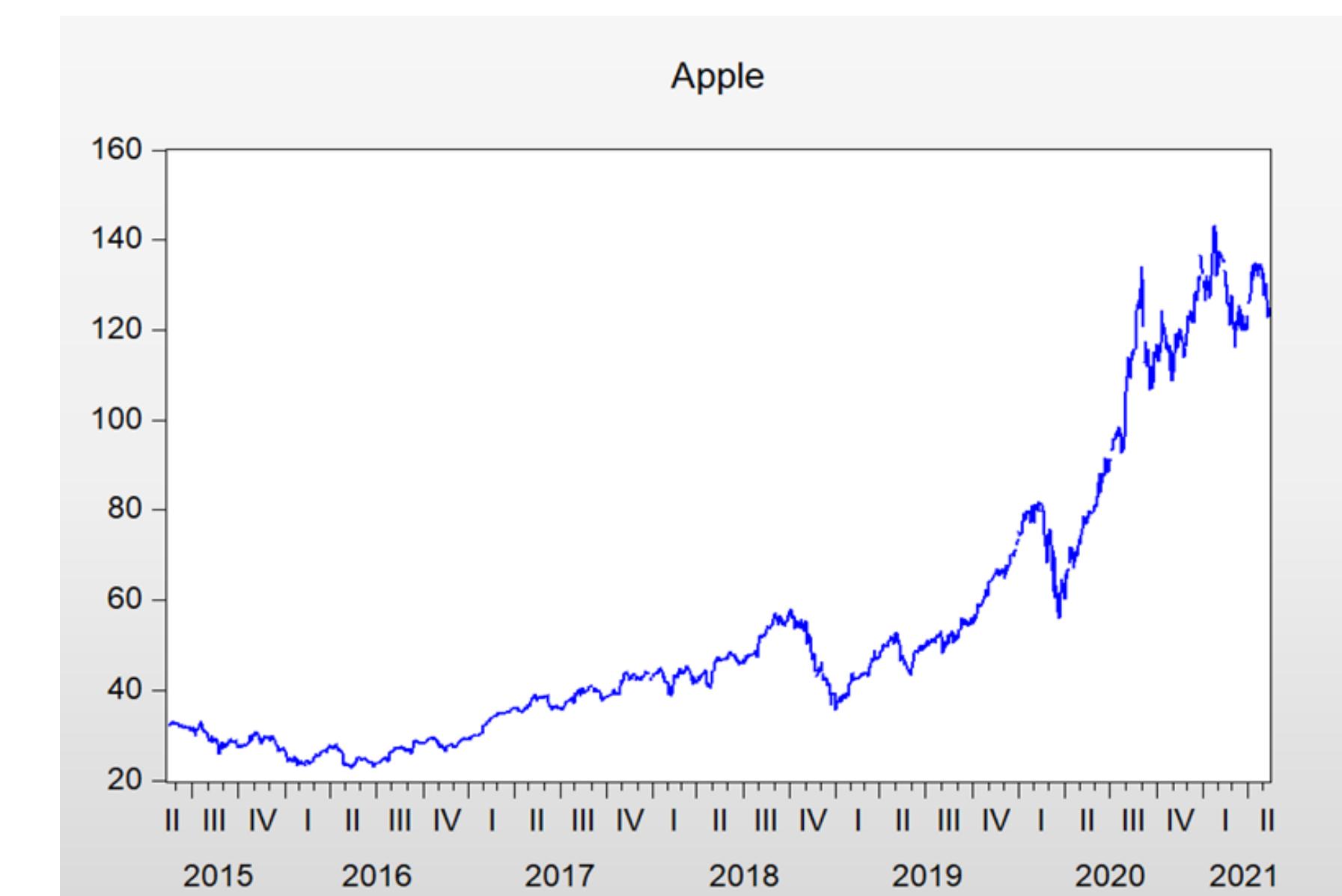
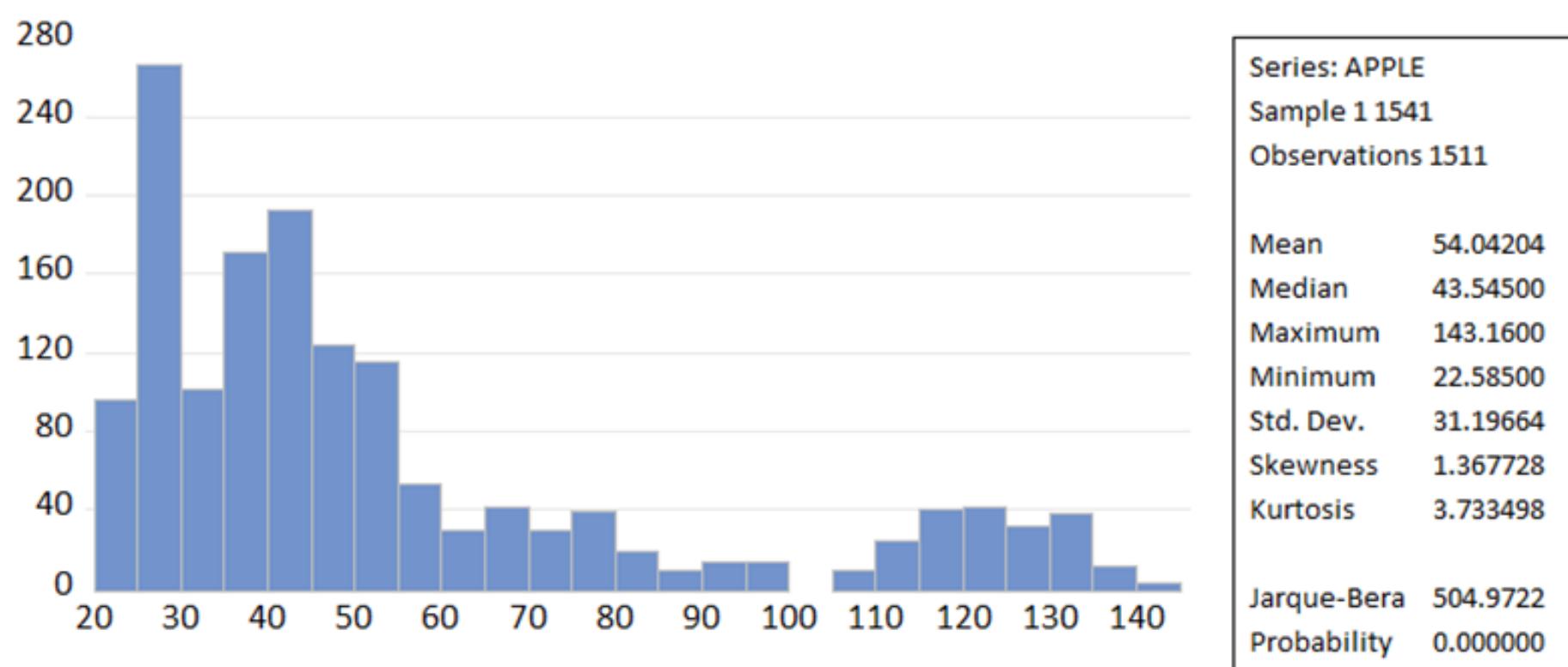
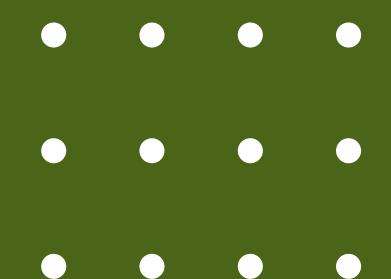
Coman Claudia Ana-Maria, grupa 1082
Ciobanu Cristina-Maria, grupa 1082

STATISTICI DESCRIPTIVE

AMAZON

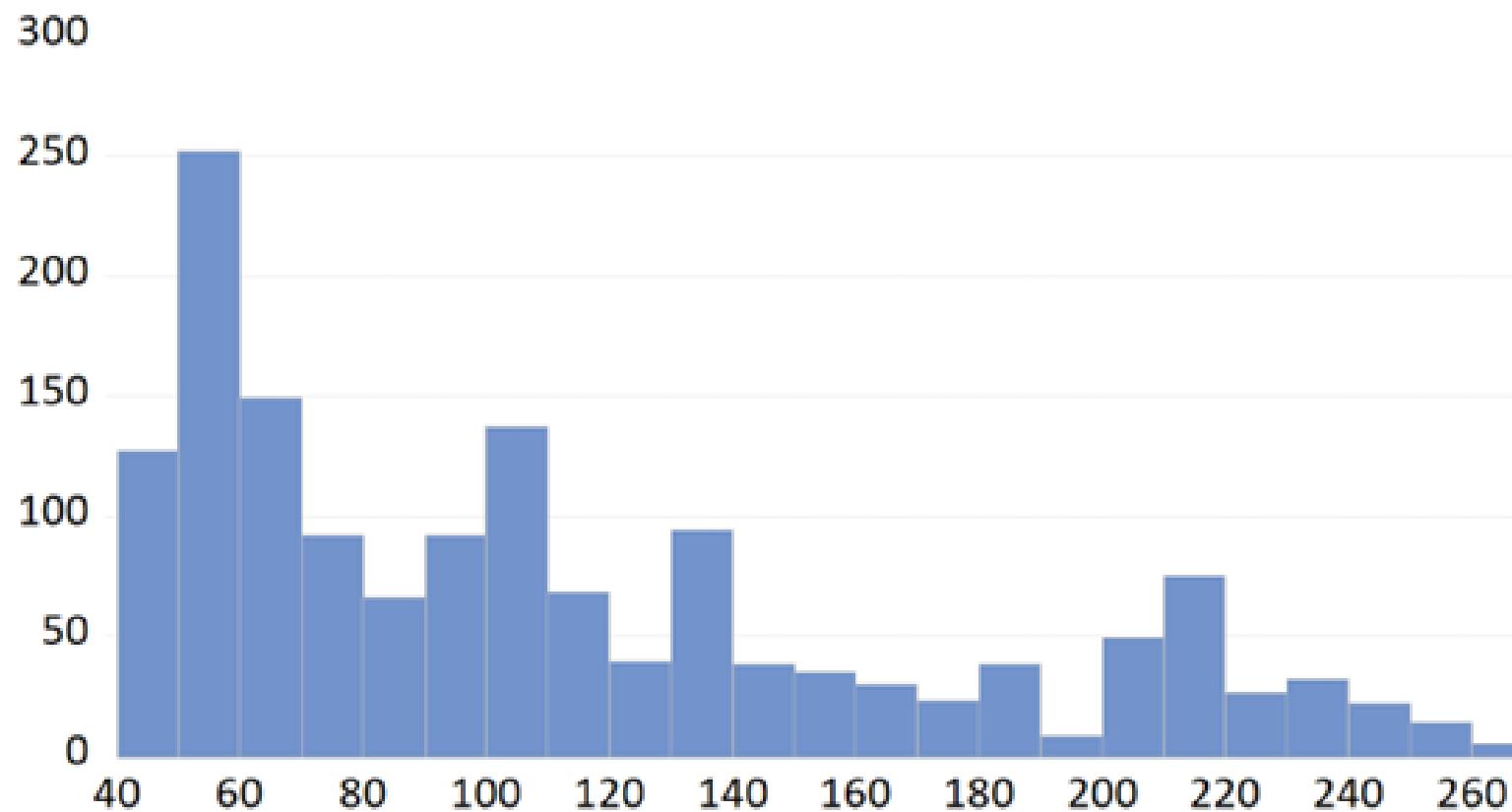
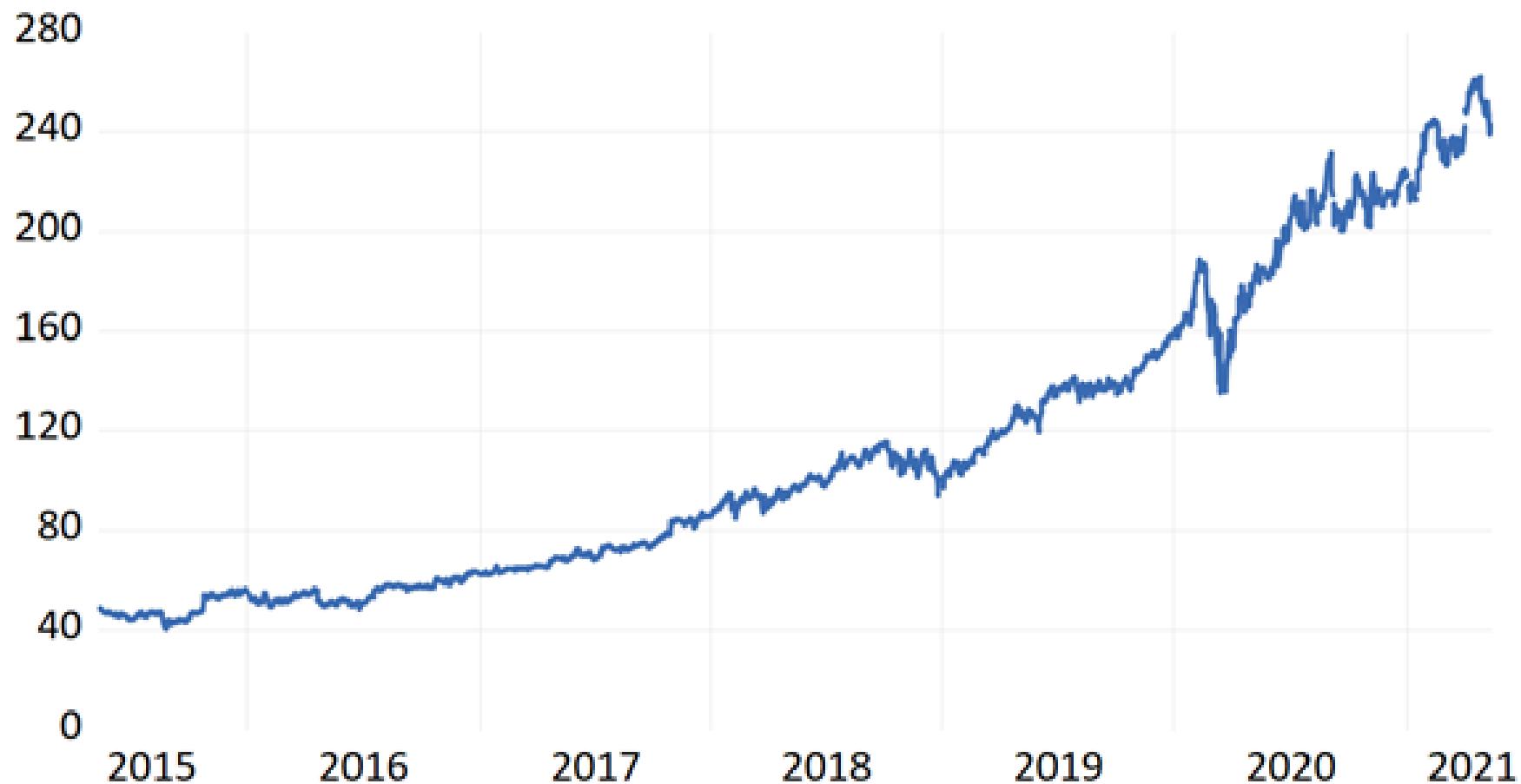


APPLE



Microsoft

MICROSOFT



Series: MICROSOFT
Sample 5/14/2015 5/13/2021
Observations 1511
Mean 111.5585
Median 96.94000
Maximum 261.9700
Minimum 40.47000
Std. Dev. 59.51124
Skewness 0.822141
Kurtosis 2.518348
Jarque-Bera 184.8238
Probability 0.000000

Testarea Stationaritatii si Stationarizarea Seriilor de Timp

AMAZON

Date: 05/20/23 Time: 09:42

Sample: 5/14/2015 5/13/2021

Included observations: 1511

Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob.
		1	0.997	0.997	1506.3 0.000
		2	0.995	0.018	3006.2 0.000
		3	0.992	-0.026	4499.4 0.000
		4	0.990	0.034	5986.4 0.000
		5	0.987	-0.039	7466.6 0.000
		6	0.985	-0.006	8940.1 0.000
		7	0.982	0.020	10407. 0.000
		8	0.980	-0.028	11867. 0.000
		9	0.977	-0.009	13320. 0.000
		10	0.974	-0.049	14765. 0.000
		11	0.971	0.012	16203. 0.000
		12	0.969	0.007	17634. 0.000
		13	0.966	0.005	19057. 0.000
		14	0.963	0.019	20474. 0.000
		15	0.961	0.026	21884. 0.000
		16	0.958	0.017	23287. 0.000
		17	0.956	-0.024	24685. 0.000
		18	0.953	0.012	26075. 0.000
		19	0.950	-0.043	27459. 0.000
		20	0.948	-0.017	28836. 0.000
		21	0.945	0.013	30205. 0.000
		22	0.942	0.021	31569. 0.000
		23	0.940	-0.016	32925. 0.000
		24	0.937	-0.003	34275. 0.000
		25	0.934	0.014	35618. 0.000
		26	0.932	0.039	36955. 0.000
		27	0.930	0.032	38286. 0.000
		28	0.927	-0.007	39612. 0.000
		29	0.925	-0.004	40933. 0.000
		30	0.923	0.020	42248. 0.000
		31	0.921	0.026	43558. 0.000
		32	0.919	-0.009	44863. 0.000
		33	0.917	-0.024	46163. 0.000
		34	0.914	-0.018	47457. 0.000
		35	0.912	0.021	48747. 0.000
		36	0.910	-0.002	50031. 0.000

Null Hypothesis: AMAZON has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=23)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-0.209747	0.9348
Test critical values:		
1% level	-3.434474	
5% level	-2.863248	
10% level	-2.567728	

Coreograma

Test ADF

DIFERENTIEM SERIA DE TEMP AMAZON

Correlogram of D(AMAZON)					
Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob.
		1	-0.057	-0.057	4.9824 0.026
		2	0.010	0.007	5.1474 0.076
		3	-0.086	-0.086	16.454 0.001
		4	0.031	0.022	17.946 0.001
		5	-0.005	-0.001	17.988 0.003
		6	-0.030	-0.038	19.362 0.004
		7	0.036	0.037	21.286 0.003
		8	-0.041	-0.039	23.903 0.002
		9	0.077	0.067	32.848 0.000
		10	-0.060	-0.045	38.269 0.000
		11	-0.005	-0.020	38.312 0.000
		12	0.005	0.019	38.353 0.000
		13	-0.043	-0.054	41.120 0.000
		14	-0.032	-0.039	42.644 0.000
		15	-0.037	-0.032	44.687 0.000
		16	0.029	0.007	45.947 0.000
		17	-0.021	-0.014	46.626 0.000
		18	0.103	0.091	62.752 0.000
		19	0.002	0.020	62.757 0.000
		20	-0.019	-0.022	63.300 0.000
		21	-0.049	-0.040	66.945 0.000
		22	-0.016	-0.018	67.354 0.000
		23	0.019	0.010	67.884 0.000
		24	-0.040	-0.039	70.285 0.000
		25	-0.055	-0.075	75.014 0.000
		26	-0.078	-0.078	84.284 0.000
		27	0.089	0.059	96.364 0.000
		28	-0.004	-0.001	96.391 0.000
		29	-0.018	-0.023	96.875 0.000
		30	-0.044	-0.035	99.835 0.000
		31	0.053	0.052	104.23 0.000
		32	0.043	0.050	107.07 0.000
		33	0.051	0.070	111.10 0.000
		34	-0.072	-0.074	119.05 0.000
		35	-0.033	-0.040	120.70 0.000
		36	0.112	0.094	140.20 0.000

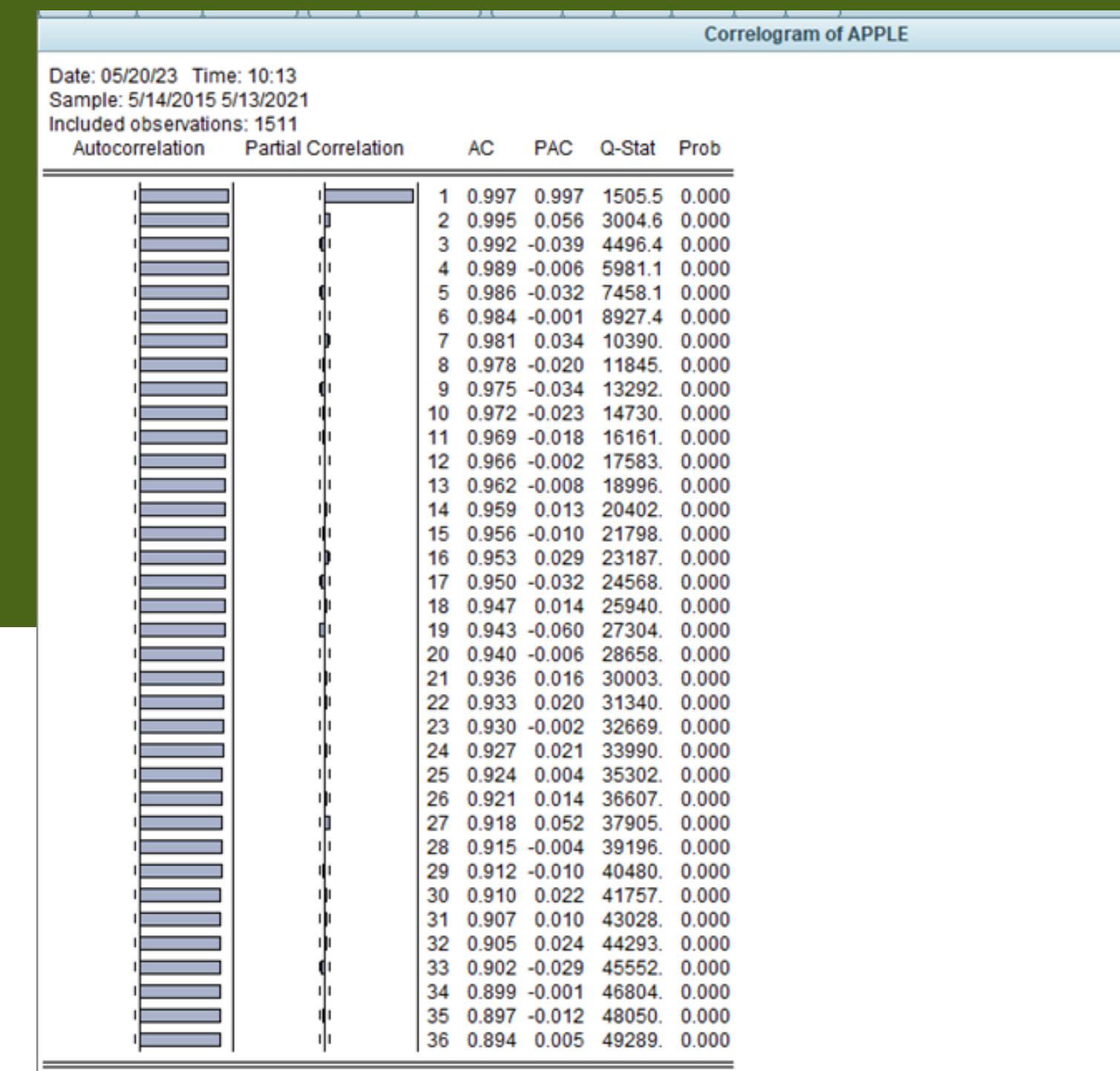
Augmented Dickey-Fuller Unit Root Test on D(AMAZON)				
Null Hypothesis: D(AMAZON) has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=23)				
t-Statistic	Prob.*			
Augmented Dickey-Fuller test statistic	-41.11570	0.0000		
Test critical values:				
1% level	-3.434477			
5% level	-2.863250			
10% level	-2.567728			
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(AMAZON,2)				
Method: Least Squares				
Date: 05/20/23 Time: 09:49				
Sample (adjusted): 5/18/2015 5/13/2021				
Included observations: 1509 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(AMAZON(-1))	-1.057387	0.025717	-41.11570	0.0000
C	1.916199	0.900332	2.128325	0.0335
R-squared	0.528694	Mean dependent var	0.010477	
Adjusted R-squared	0.528382	S.D. dependent var	50.85991	
S.E. of regression	34.92778	Akaike info criterion	9.945766	
Sum squared resid	1838464.	Schwarz criterion	9.952816	
Log likelihood	-7502.081	Hannan-Quinn criter.	9.948392	
F-statistic	1690.501	Durbin-Watson stat	1.999190	
Prob(F-statistic)	0.000000			



Stationarizarea seriei de timp Apple

Augmented Dickey-Fuller Unit Root Test on APPLE		
Null Hypothesis: APPLE has a unit root		
Exogenous: Constant		
Lag Length: 1 (Automatic - based on SIC, maxlag=23)		
	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	0.820180	0.9944
Test critical values:		
1% level	-3.434477	
5% level	-2.863250	
10% level	-2.567728	

*Mackinnon (1996) one-sided p-values.



Diferentierea seriei de timp Apple



Augmented Dickey-Fuller Unit Root Test on D(APPLE)

Null Hypothesis: D(APPLE) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=23)

	t-Statistic	Prob.*
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Augmented Dickey-Fuller test statistic	-43.64908	0.0001
Test critical values:		
1% level	-3.434477	
5% level	-2.863250	
10% level	-2.567728	

Date: 05/20/23 Time: 13:10
Sample (adjusted): 5/15/2015 5/13/2021
Included observations: 1510 after adjustments

	Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob.	
1	0.000	0.000	1	-0.117	-0.117	20.836	0.000
2	0.043	0.029	2	0.043	0.029	23.609	0.000
3	-0.026	-0.018	3	-0.026	-0.018	24.621	0.000
4	0.008	0.001	4	0.008	0.001	24.709	0.000
5	0.001	0.004	5	0.001	0.004	24.712	0.000
6	-0.056	-0.057	6	-0.056	-0.057	29.415	0.000
7	0.065	0.054	7	0.065	0.054	35.886	0.000
8	-0.033	-0.016	8	-0.033	-0.016	37.541	0.000
9	0.082	0.072	9	0.082	0.072	47.732	0.000
10	-0.014	0.007	10	-0.014	0.007	48.043	0.000
11	0.001	-0.006	11	0.001	-0.006	48.045	0.000
12	0.007	0.008	12	0.007	0.008	48.126	0.000
13	-0.058	-0.052	13	-0.058	-0.052	53.199	0.000
14	0.035	0.018	14	0.035	0.018	55.098	0.000
15	-0.039	-0.021	15	-0.039	-0.021	57.472	0.000
16	0.063	0.044	16	0.063	0.044	63.448	0.000
17	-0.055	-0.038	17	-0.055	-0.038	68.091	0.000
18	0.148	0.132	18	0.148	0.132	101.44	0.000
19	0.003	0.032	19	0.003	0.032	101.46	0.000
20	-0.049	-0.048	20	-0.049	-0.048	105.09	0.000
21	0.004	-0.009	21	0.004	-0.009	105.12	0.000
22	-0.056	-0.042	22	-0.056	-0.042	110.00	0.000
23	0.008	-0.018	23	0.008	-0.018	110.09	0.000
24	-0.071	-0.049	24	-0.071	-0.049	117.88	0.000
25	0.016	-0.019	25	0.016	-0.019	118.26	0.000
26	-0.076	-0.076	26	-0.076	-0.076	127.13	0.000
27	0.061	0.035	27	0.061	0.035	132.89	0.000
28	0.022	0.028	28	0.022	0.028	133.66	0.000
29	-0.008	0.012	29	-0.008	0.012	133.76	0.000
30	-0.012	-0.025	30	-0.012	-0.025	133.99	0.000
31	-0.037	-0.013	31	-0.037	-0.013	136.06	0.000
32	0.061	0.045	32	0.061	0.045	141.71	0.000
33	-0.045	-0.013	33	-0.045	-0.013	144.87	0.000
34	0.053	0.032	34	0.053	0.032	149.29	0.000
35	-0.022	-0.002	35	-0.022	-0.002	150.03	0.000
36	0.061	0.040	36	0.061	0.040	155.87	0.000

Stationarizarea seriei de timp Microsoft

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Date: 05/20/23 Time: 10:28	Sample: 5/14/2015 - 5/13/2021	Included observations: 1511	Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob
					1	0.997	0.997	1505.5 0.000
					2	0.995	0.090	3005.1 0.000
					3	0.992	-0.048	4497.9 0.000
					4	0.990	-0.021	5983.7 0.000
					5	0.987	-0.021	7462.2 0.000
					6	0.984	0.006	8933.5 0.000
					7	0.982	0.048	10398. 0.000
					8	0.979	-0.039	11856. 0.000
					9	0.976	0.003	13307. 0.000
					10	0.973	-0.046	14751. 0.000
					11	0.971	0.014	16187. 0.000
					12	0.968	-0.001	17616. 0.000
					13	0.965	-0.043	19037. 0.000
					14	0.962	0.022	20450. 0.000
					15	0.959	-0.008	21856. 0.000
					16	0.956	0.040	23255. 0.000
					17	0.953	-0.038	24646. 0.000
					18	0.951	0.010	26029. 0.000
					19	0.948	-0.015	27406. 0.000
					20	0.945	-0.003	28774. 0.000
					21	0.942	0.013	30136. 0.000
					22	0.939	0.006	31490. 0.000
					23	0.936	0.008	32837. 0.000
					24	0.934	0.012	34177. 0.000
					25	0.931	0.010	35511. 0.000
					26	0.928	0.016	36838. 0.000
					27	0.926	0.039	38159. 0.000
					28	0.924	-0.003	39475. 0.000
					29	0.921	-0.006	40784. 0.000
					30	0.919	0.024	42088. 0.000
					31	0.917	0.022	43387. 0.000
					32	0.915	0.023	44682. 0.000
					33	0.913	-0.034	45971. 0.000
					34	0.911	-0.013	47254. 0.000
					35	0.909	0.020	48533. 0.000
					36	0.907	-0.003	49807. 0.000

Augmented Dickey-Fuller Unit Root Test on MICROSOFT

Null Hypothesis: MICROSOFT has a unit root

Exogenous: Constant

Lag Length: 9 (Automatic - based on SIC, maxlag=23)

t-Statistic Prob.*

Augmented Dickey-Fuller test statistic 0.737288 0.9929

Test critical values: 1% level -3.434499
 5% level -2.863260
 10% level -2.567734

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Diferentierea seriei de timp Microsoft

Augmented Dickey-Fuller Unit Root Test on D(MICROSOFT)

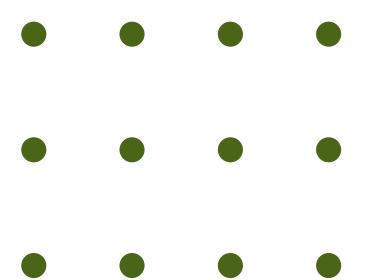
Null Hypothesis: D(MICROSOFT) has a unit root

Exogenous: Constant

Lag Length: 8 (Automatic - based on SIC, maxlag=23)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-12.17426	0.0000
Test critical values:		
1% level	-3.434499	
5% level	-2.863260	
10% level	-2.567734	

Correlogram of D(MICROSOFT)					
	Autocorrelation	Partial Correlation	AC	PAC	Q-Stat
1	-0.260	-0.260	102.47	0.000	
2	0.076	0.009	111.16	0.000	
3	0.015	0.040	111.51	0.000	
4	-0.016	-0.003	111.89	0.000	
5	0.004	-0.004	111.92	0.000	
6	-0.113	-0.121	131.30	0.000	
7	0.131	0.080	157.39	0.000	
8	-0.114	-0.055	177.29	0.000	
9	0.157	0.124	214.56	0.000	
10	-0.096	-0.038	228.63	0.000	
11	0.003	-0.038	228.65	0.000	
12	0.021	-0.002	229.32	0.000	
13	-0.106	-0.082	246.36	0.000	
14	0.055	-0.006	251.03	0.000	
15	-0.111	-0.066	269.80	0.000	
16	0.118	0.048	290.94	0.000	
17	-0.064	-0.000	297.18	0.000	
18	0.064	0.033	303.53	0.000	
19	-0.034	-0.026	305.32	0.000	
20	-0.034	-0.035	307.05	0.000	
21	0.059	0.017	312.38	0.000	
22	-0.114	-0.049	332.27	0.000	
23	0.022	-0.057	333.02	0.000	
24	-0.059	-0.038	338.40	0.000	
25	-0.004	-0.066	338.43	0.000	
26	-0.091	-0.109	351.31	0.000	
27	0.042	-0.001	354.06	0.000	
28	-0.004	-0.015	354.09	0.000	
29	-0.011	0.021	354.28	0.000	
30	0.051	0.017	358.27	0.000	
31	-0.043	0.000	361.18	0.000	
32	0.073	0.039	369.49	0.000	
33	-0.036	0.006	371.50	0.000	
34	-0.006	-0.031	371.56	0.000	
35	-0.025	-0.038	372.51	0.000	
36	0.033	0.010	374.24	0.000	

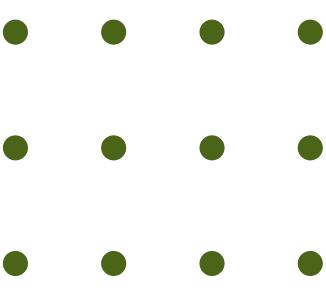


Identificarea, estimarea si testarea modelului ARMA potrivit seriilor de timp

Sample (adjusted): 5 1511 Q-statistic probabilities adjusted for 6 ARMA terms						
Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob	
		1 -0.011	-0.011	0.1867		
		2 0.009	0.009	0.3229		
		3 -0.041	-0.041	2.8952		
		4 0.031	0.030	4.3597		
		5 0.018	0.019	4.8335		
		6 -0.012	-0.014	5.0491		
		7 0.032	0.034	6.5803	0.010	
		8 -0.008	-0.007	6.6898	0.035	
		9 0.060	0.057	12.073	0.007	
		10 -0.031	-0.027	13.569	0.009	
		11 -0.012	-0.016	13.800	0.017	
		12 0.011	0.015	13.972	0.030	
		13 -0.028	-0.033	15.139	0.034	
		14 -0.048	-0.052	18.671	0.017	
		15 -0.010	-0.006	18.830	0.027	
		16 0.011	0.004	19.003	0.040	
		17 -0.007	-0.007	19.069	0.060	
		18 0.101	0.103	34.781	0.001	
		19 -0.005	0.002	34.812	0.001	
		20 -0.004	-0.005	34.843	0.002	
		21 -0.064	-0.057	41.186	0.000	
		22 -0.003	-0.007	41.204	0.001	
		23 0.010	0.011	41.363	0.001	
		24 -0.041	-0.047	43.929	0.001	
		25 -0.048	-0.055	47.472	0.000	
		26 -0.089	-0.086	59.741	0.000	
		27 0.100	0.082	75.033	0.000	
		28 -0.010	-0.002	75.194	0.000	
		29 -0.017	-0.017	75.635	0.000	
		30 -0.033	-0.017	77.316	0.000	
		31 0.042	0.046	80.007	0.000	
		32 0.061	0.071	85.834	0.000	
		33 0.040	0.057	88.311	0.000	
		34 -0.059	-0.067	93.697	0.000	
		35 -0.030	-0.033	95.083	0.000	
		36 0.108	0.088	113.18	0.000	

→ Modele	Criteriul Akaike	Criteriul Schwartz	R^2	Durbin-Watson
AR(3)	9,942283	9,956398	0.010690	1,996189
AR(8)	9,945306	10,0129	0.037026	2,003706
ARMA(3,3)	9,913425	9,957585	0.061760	2,022227
ARMA(3,18)	9,932884	9,991058	0.061520	1,998982
ARMA(18,3)	9,923306	10,00157	0.023839	2,000564
MA(3)	9,940491	9,954583	0.010539	2,006044
MA(18)	9,933057	9,999996	0.037187	2,000484

Tabel comparatie modele ARMA pentru amazon2



Heteroskedasticity Test: ARCH

F-statistic	90.86680	Prob. F(1,1504)	0.0000
Obs*R-squared	85.80366	Prob. Chi-Square(1)	0.0000

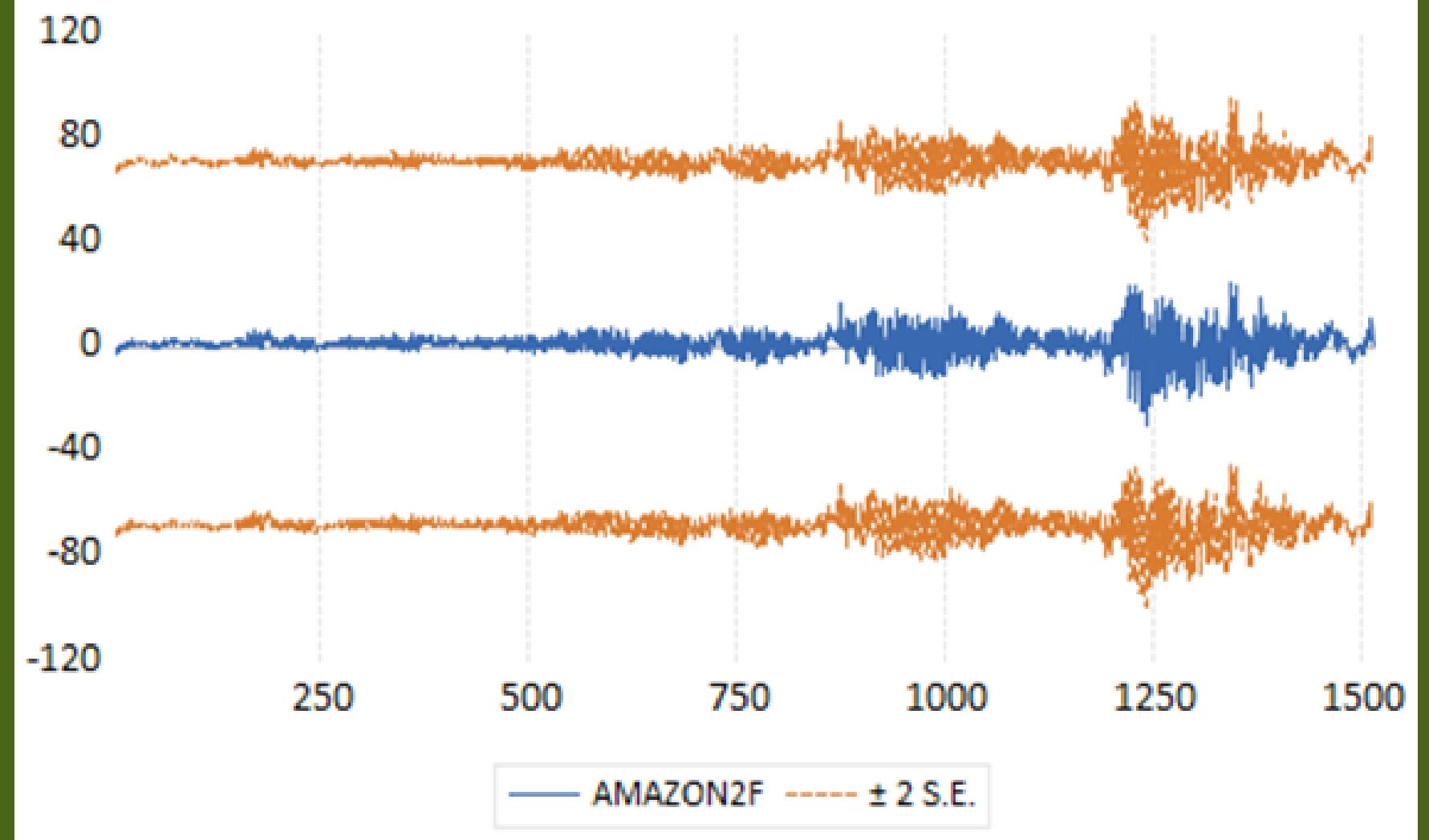
Homoscedasticitate patrate reziduri amazon2

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 2 lags

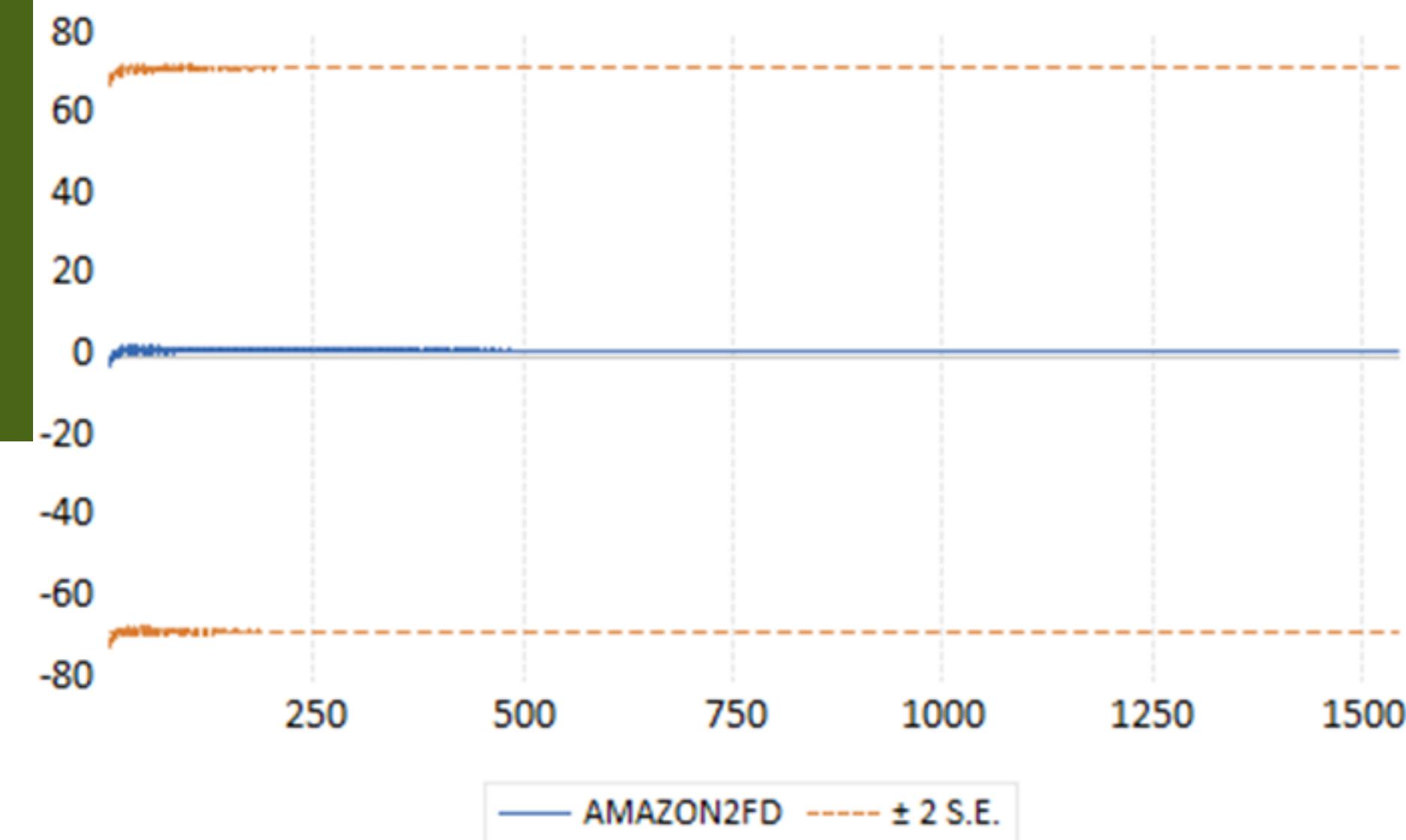
F-statistic	0.176887	Prob. F(2,1498)	0.8379
Obs*R-squared	0.355815	Prob. Chi-Square(2)	0.8370

Testul multiplicatorului lui Lagrange pentru a

EFECTUAREA DE PROGNOZE



Prognoza statică pentru urmatoarea luna
Amazon



Prognoza dinamica pentru urmatoarea luna
Amazon

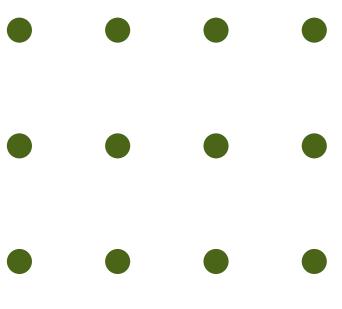
Determinarea modelelor ARIMA pentru seria diferențiata apple2

Autocorrelation Partial Correlation AC PAC Q-Stat Prob						
		1	0.004	0.004	0.0186	
		2	0.027	0.027	1.1406	0.286
		3	-0.020	-0.021	1.7730	0.412
		4	0.005	0.005	1.8149	0.612
		5	-0.004	-0.003	1.8433	0.765
		6	-0.049	-0.050	5.5529	0.352
		7	0.057	0.058	10.413	0.108
		8	-0.016	-0.014	10.799	0.148
		9	0.078	0.074	20.147	0.010
		10	-0.005	-0.002	20.179	0.017
		11	0.000	-0.005	20.180	0.028
		12	0.001	0.002	20.181	0.043
		13	-0.054	-0.051	24.656	0.017
		14	0.025	0.022	25.581	0.019
		15	-0.029	-0.018	26.872	0.020
		16	0.053	0.042	31.187	0.008
		17	-0.032	-0.028	32.713	0.008
		18	0.146	0.139	65.183	0.000
		19	0.015	0.010	65.516	0.000
		20	-0.049	-0.051	69.220	0.000
		21	-0.008	-0.008	69.323	0.000
		22	-0.056	-0.043	74.185	0.000
		23	-0.007	-0.019	74.271	0.000
		24	-0.070	-0.049	81.851	0.000
		25	-0.002	-0.022	81.854	0.000
		26	-0.069	-0.070	89.195	0.000
		27	0.056	0.046	94.082	0.000
		28	0.029	0.023	95.403	0.000
		29	-0.007	0.006	95.486	0.000
		30	-0.018	-0.027	95.978	0.000
		31	-0.032	-0.005	97.567	0.000
		32	0.053	0.044	101.84	0.000
		33	-0.033	-0.014	103.51	0.000
		34	0.047	0.034	106.91	0.000
		35	-0.009	-0.002	107.03	0.000
		36	0.056	0.034	111.80	0.000

Modele	Criteriul Akaike	Criteriul Schwartz	R^2	Durbin Watson
AR(1)	3.41831	3.42536	0.051412	1.99181
AR(18)	3.413503	3.481097	0.050878	2.007023
MA(1)	3.41987	3.430439	0.012919	2.007379
MA(18)	3.406732	3.473671	0.046222	1.996757
ARMA(1,1)	3.418539	3.429114	0.014875	1.999126
ARMA(1,18)	3.408714	3.479214	0.046239	1.997961
ARMA(18,1)	3.414282	3.485433	0.013794	2.000565

Tabel 2 Tabel comparatie modele ARMA pentru apple2

DIAGNOSTICAREA MODELULUI ALES



Heteroskedasticity Test: ARCH

F-statistic	71.67508	Prob. F(1,1507)	0.0000
Obs*R-squared	68.51169	Prob. Chi-Square(1)	0.0000

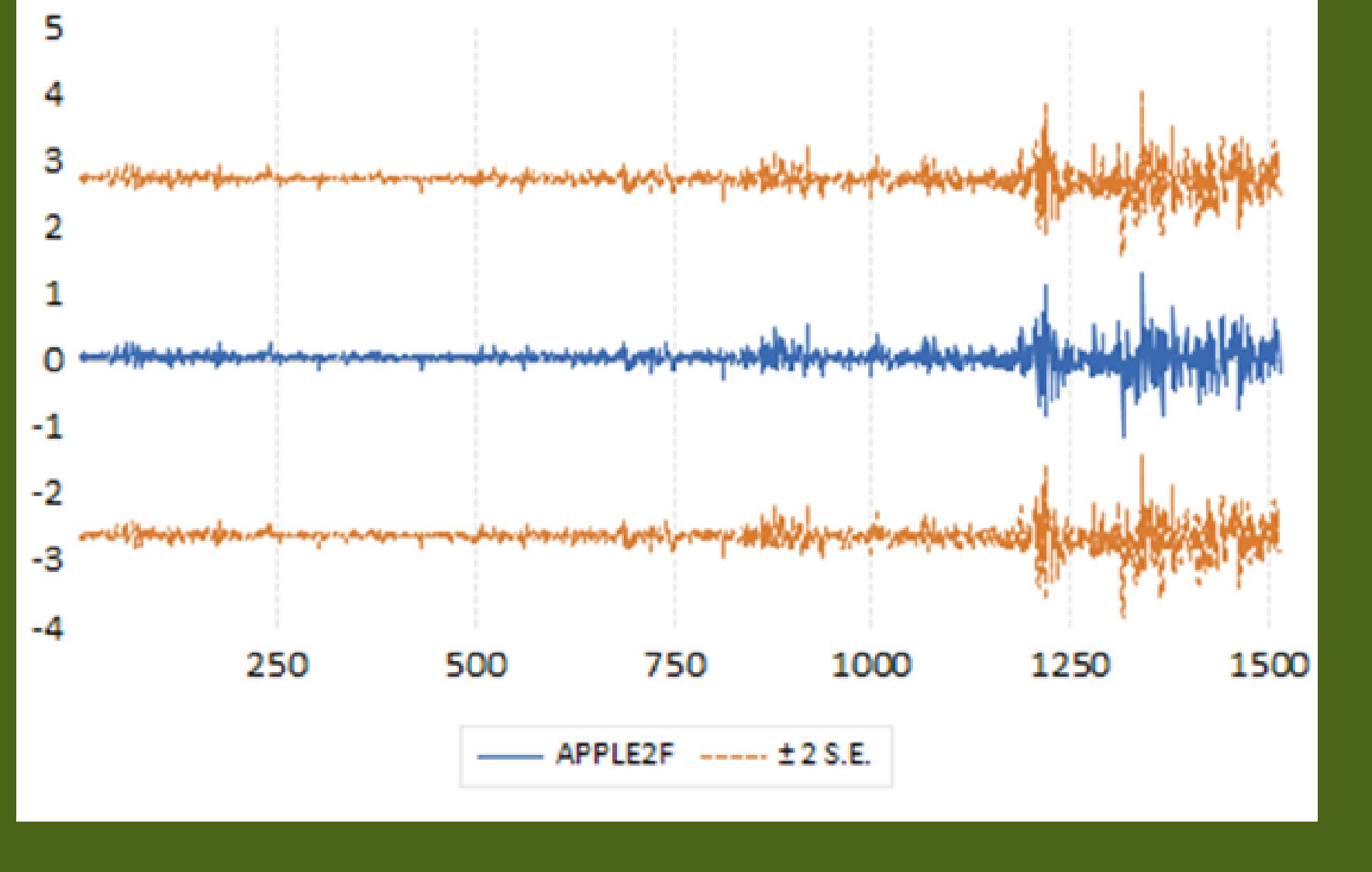
Homoscedasticitate patrate reziduri apple2

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 2 lags

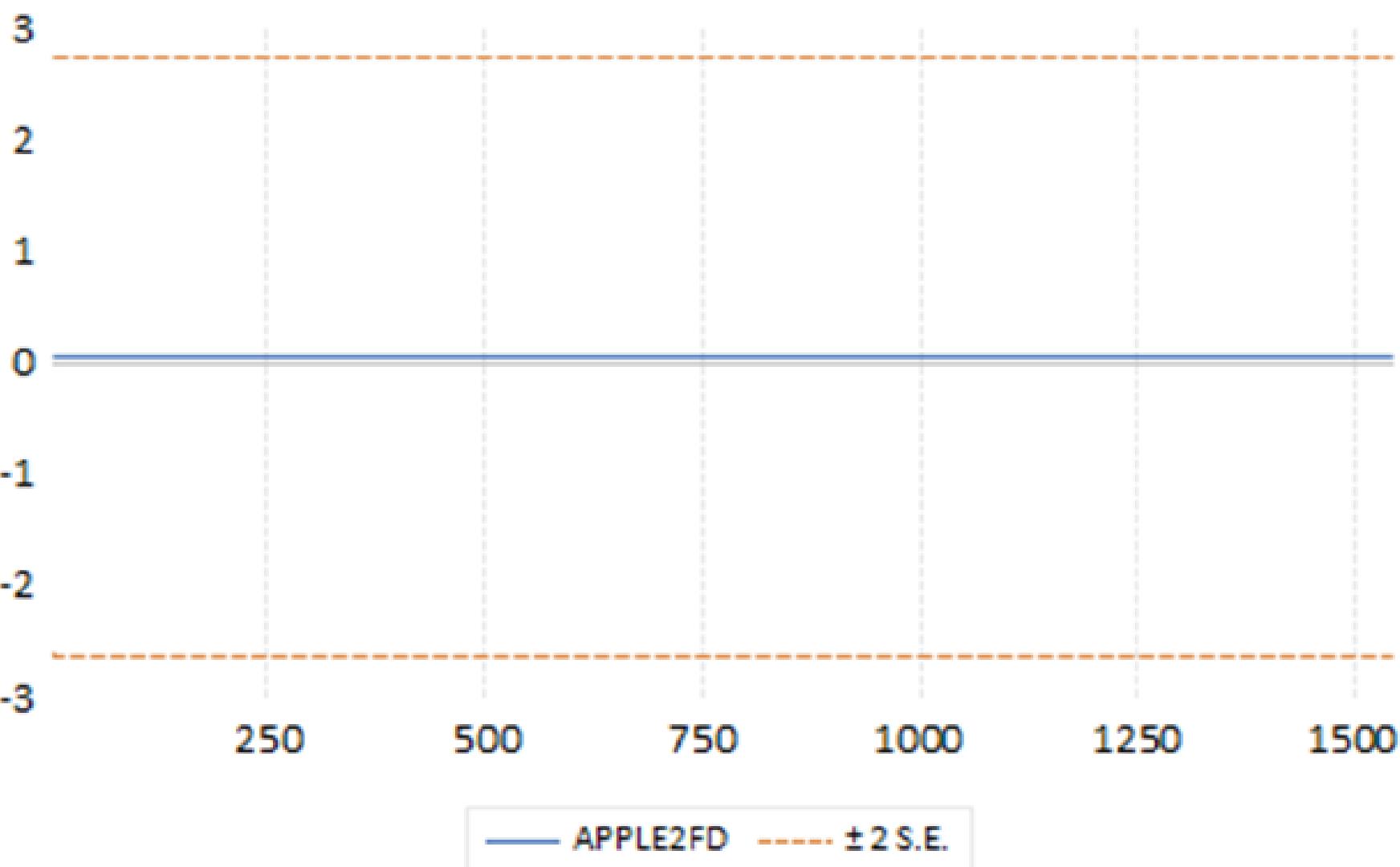
F-statistic	0.923373	Prob. F(2,1505)	0.3974
Obs*R-squared	1.849385	Prob. Chi-Square(2)	0.3967

Testul multiplicatorului lui Lagrange pentru apple2

EFECTUAREA DE PROGNOZE



Prognoza statică pentru urmatoarea luna
Apple



Prognoza dinamica pentru urmatoarea luna Apple

Determinarea modelelor ARIMA pentru seria diferențiata microsoft2

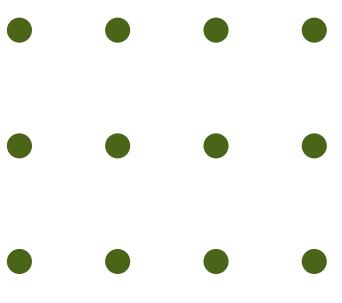
Sample (adjusted): 2 1511
 Q-statistic probabilities adjusted for 18 ARMA terms

Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob
		1	0.014	0.014	0.2964
		2	0.008	0.008	0.3884
		3	0.018	0.018	0.8972
		4	0.031	0.031	2.3623
		5	-0.006	-0.007	2.4205
		6	0.010	0.010	2.5856
		7	-0.006	-0.007	2.6391
		8	-0.011	-0.012	2.8285
		9	0.014	0.014	3.1210
		10	0.001	0.000	3.1230
		11	-0.012	-0.011	3.3454
		12	-0.009	-0.008	3.4557
		13	-0.037	-0.037	5.5107
		14	0.001	0.003	5.5127
		15	-0.014	-0.013	5.8182
		16	0.053	0.055	10.039
		17	0.022	0.023	10.759
		18	-0.021	-0.023	11.444
		19	-0.026	-0.026	12.443 0.000
		20	-0.032	-0.036	13.987 0.001
		21	0.003	0.004	13.997 0.003
		22	-0.046	-0.044	17.279 0.002
		23	-0.020	-0.017	17.897 0.003
		24	-0.022	-0.018	18.624 0.005
		25	-0.056	-0.056	23.442 0.001
		26	-0.063	-0.061	29.487 0.000
		27	-0.004	-0.000	29.508 0.001
		28	-0.014	-0.010	29.831 0.001
		29	0.004	0.014	29.853 0.002
		30	0.003	0.005	29.865 0.003
		31	0.009	0.009	29.983 0.005
		32	0.083	0.081	40.684 0.000
		33	0.001	-0.009	40.686 0.000
		34	-0.001	-0.001	40.689 0.001
		35	-0.002	-0.004	40.694 0.001
		36	0.021	0.018	41.362 0.001

Model	Akaike	Schwartz	R^2	Durbin-Watson	
AR(1)	4.52538	4.535949	0.067845	1.994887	9.061329
AR(9)	4.493672	4.532426	0.106641	1.989722	9.02698
ARMA(1,1)	4.526636	4.540729	0.067908	1.999151	9.067365
ARMA(9,9)	4.478759	4.548221	0.130734	1.97115	9.026098
ARMA(1,9)	4.505147	4.547425	0.097454	2.00325	9.052572
ARMA(9,1)	4.494132	4.536409	0.107418	1.997273	9.030541
MA(1)	4.531734	4.542303	0.061895	2.040105	9.074037
MA(9)	4.507506	4.54626	0.094108	2.011841	9.053766
	4.478759	4.532426			9.026098

Tabel 3 Tabel modele ARMA pt Microsoft2

DIAGNOSTICAREA MODELULUI ALES



Heteroskedasticity Test: ARCH

F-statistic	229.9119	Prob. F(1,1507)	0.0000
Obs*R-squared	199.7436	Prob. Chi-Square(1)	0.0000

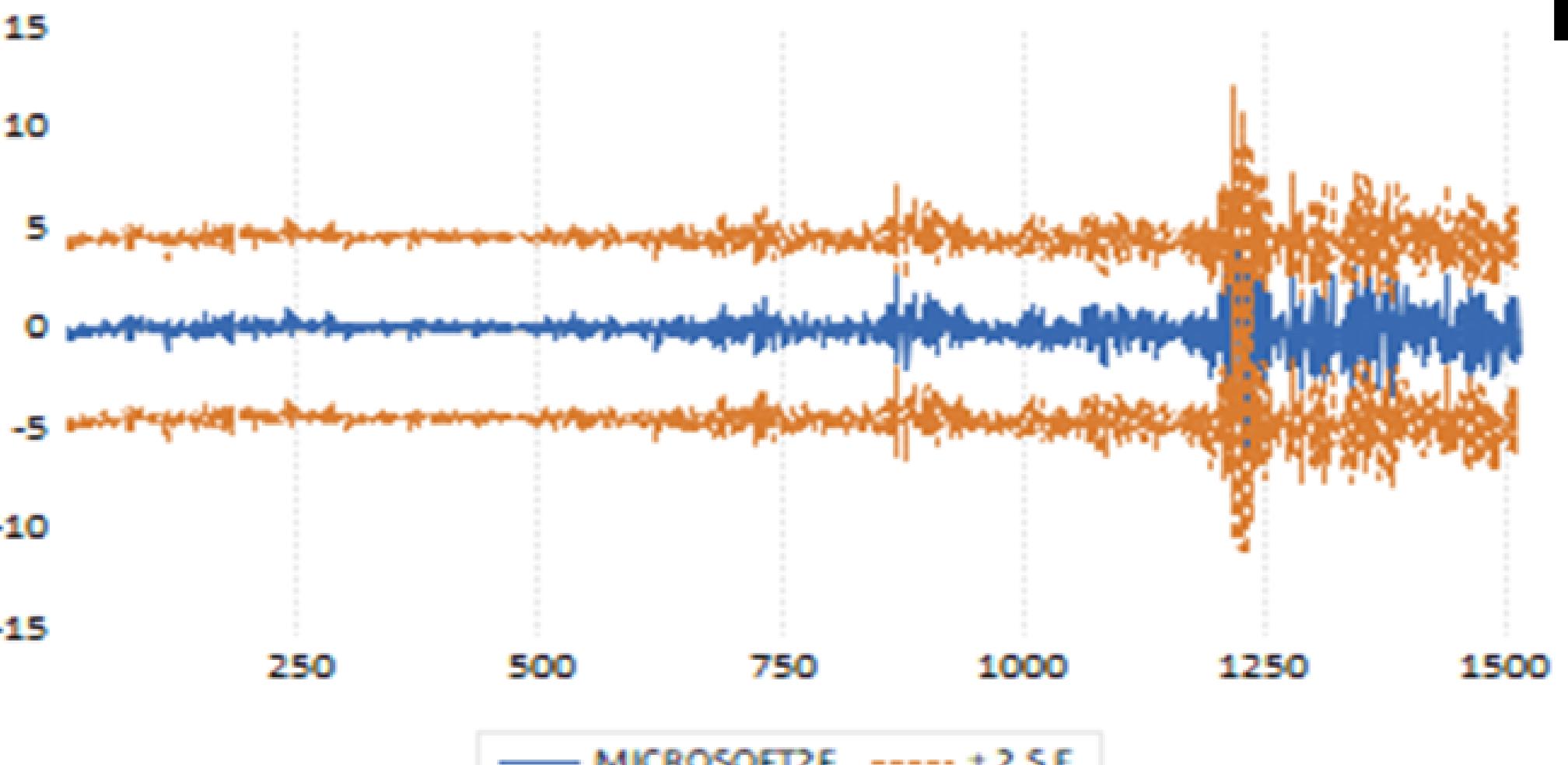
Homoscedasticitate patrate reziduri microsoft2

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 2 lags

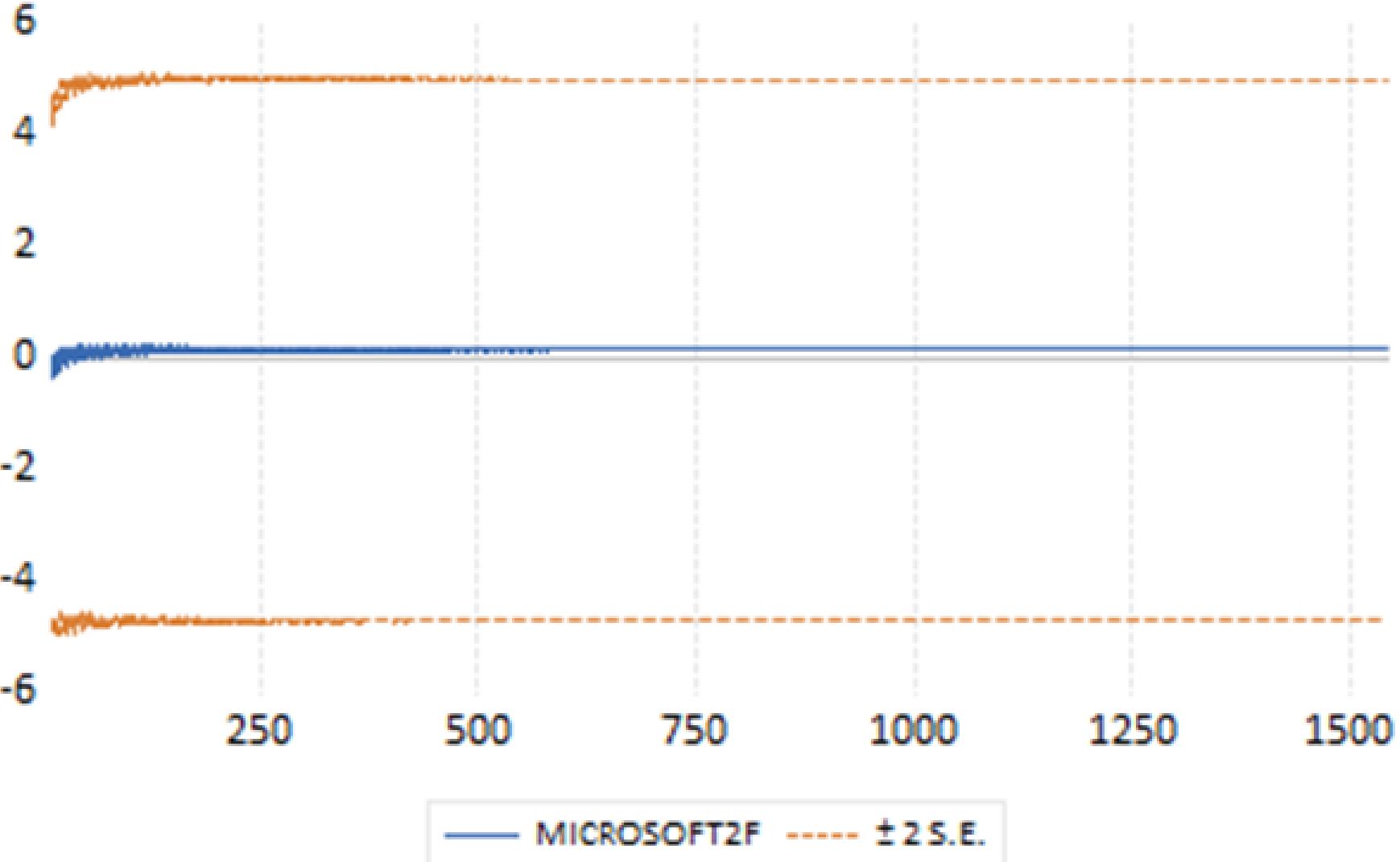
F-statistic	0.212534	Prob. F(2,1480)	0.8086
Obs*R-squared	0.430976	Prob. Chi-Square(2)	0.8061

Testul multiplicatorului lui Lagrange pentru microsoft2

EFFECTUAREA MODELULUI DE PROGNOZE



Prognoza statică pentru urmatoarea luna
Microsoft



Prognoza dinamica pentru urmatoarea luna
Microsoft



Cointegrare

Amazon - Apple

Analiza de cointegrare

Dependent Variable: AMAZON
 Method: Least Squares
 Date: 05/20/23 Time: 13:41
 Sample: 5/14/2015 5/13/2021
 Included observations: 1511

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	133.7270	14.06720	9.506297	0.0000
APPLE	26.18782	0.225454	116.1558	0.0000
R-squared	0.899408	Mean dependent var	1548.970	
Adjusted R-squared	0.899341	S.D. dependent var	861.4473	
S.E. of regression	273.3094	Akaike info criterion	14.06041	
Sum squared resid	1.13E+08	Schwarz criterion	14.06745	
Log likelihood	-10620.64	Hannan-Quinn criter.	14.06303	
F-statistic	13492.17	Durbin-Watson stat	0.011521	
Prob(F-statistic)	0.000000			

Augmented Dickey-Fuller Unit Root Test on UT

Null Hypothesis: UT has a unit root

Exogenous: Constant

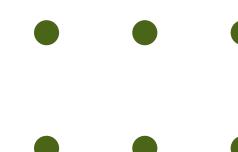
Lag Length: 0 (Automatic - based on SIC, maxlag=23)

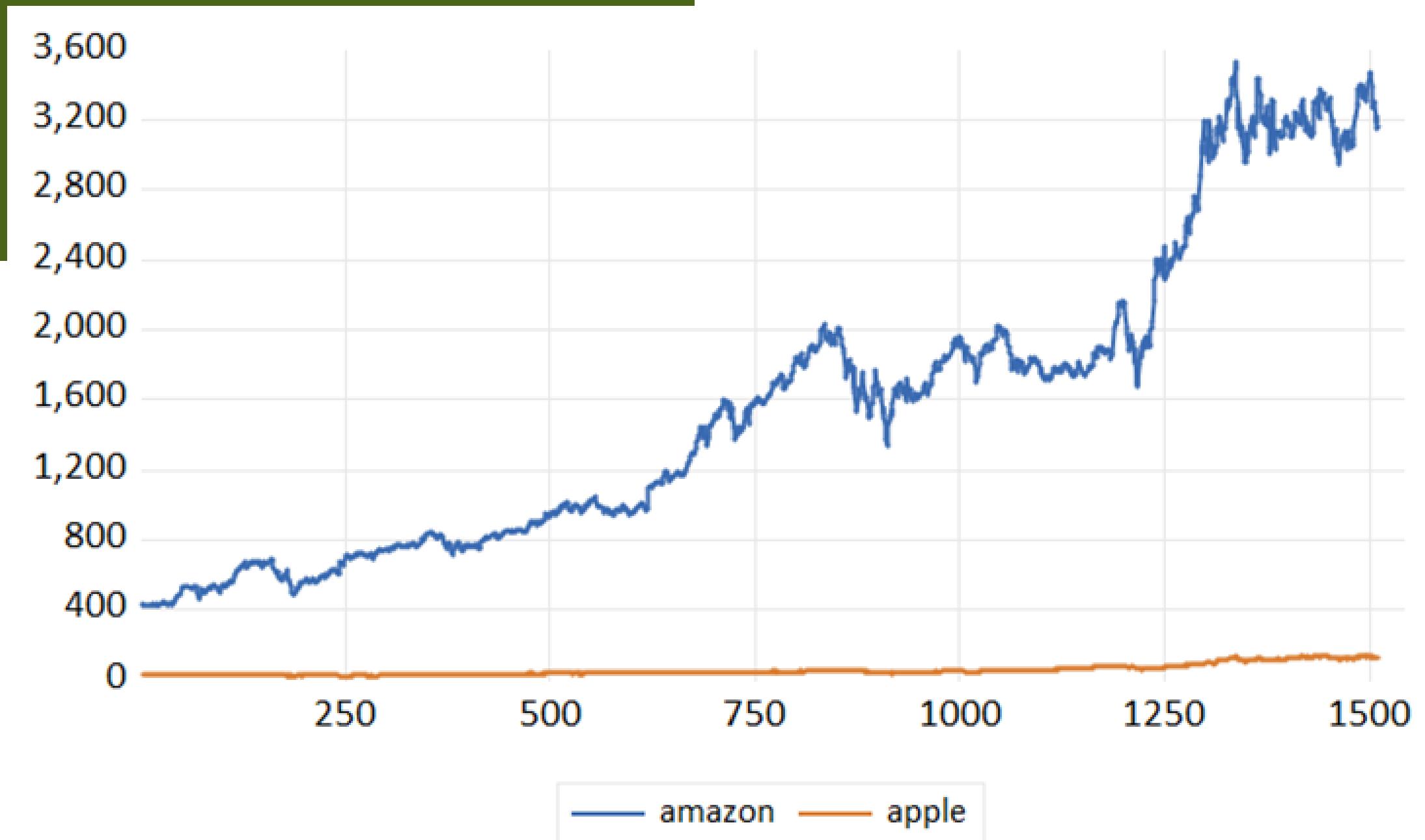
	t-Statistic	Prob. *
Augmented Dickey-Fuller test statistic	-2.471518	0.1227
Test critical values:		
1% level	-3.434474	
5% level	-2.863248	
10% level	-2.567728	

*MacKinnon (1996) one-sided p-values.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
UT(-1)	-0.006819	0.002759	-2.471518	0.0136
C	0.200264	0.753647	0.265726	0.7905

R-squared	0.004034	Mean dependent var	0.199158
Adjusted R-squared	0.003374	S.D. dependent var	29.33528
S.E. of regression	29.28575	Akaike info criterion	9.593403
Sum squared resid	1293344.	Schwarz criterion	9.600449
Log likelihood	-7241.019	Hannan-Quinn criter.	9.596027
F-statistic	6.108400	Durbin-Watson stat	2.026557
Prob(F-statistic)	0.013564		





Grafic Amazon-Apple



Cointegrale Apple - Microsoft



Augmented Dickey-Fuller Unit Root Test on UT

Null Hypothesis: UT has a unit root

Exogenous: Constant

Lag Length: 1 (Automatic - based on SIC, maxlag=23)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.216777	0.2004
Test critical values:		
	1% level	-3.434477
	5% level	-2.863250
	10% level	-2.567728

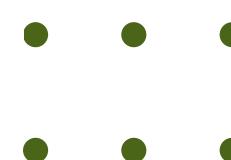
*MacKinnon (1996) one-sided p-values.

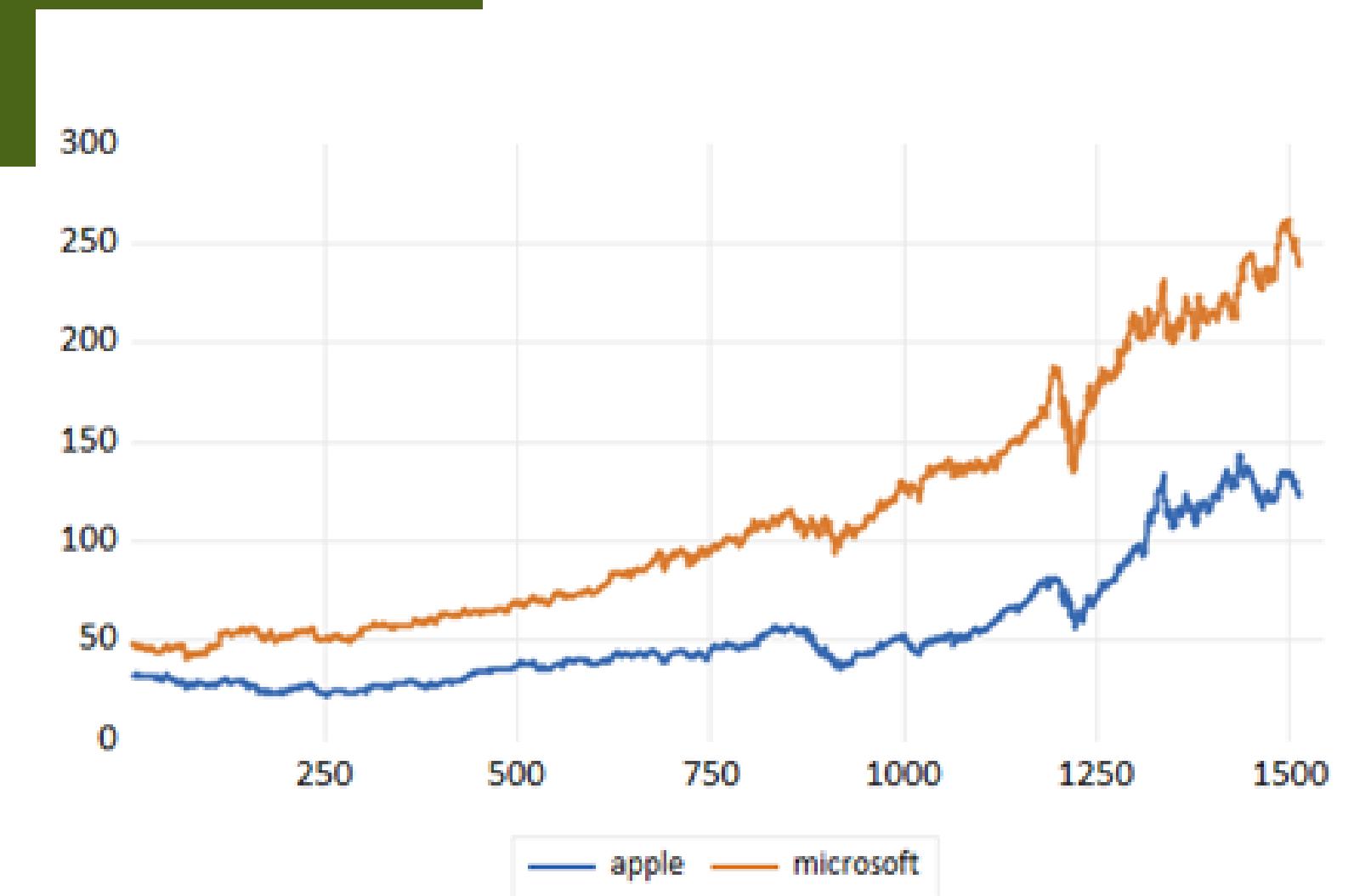
	Variable	Coefficient	Std. Error	t-Statistic	Prob.
	UT(-1)	-0.006551	0.002955	-2.216777	0.0268
	D(UT(-1))	-0.073493	0.025689	-2.860901	0.0043
	C	-0.004047	0.024563	-0.164745	0.8692

R-squared	0.009098	Mean dependent var	-0.003711
Adjusted R-squared	0.007782	S.D. dependent var	0.957888
S.E. of regression	0.954154	Akaike info criterion	2.746003
Sum squared resid	1371.078	Schwarz criterion	2.756578
Log likelihood	-2068.859	Hannan-Quinn criter.	2.749941
F-statistic	6.913421	Durbin-Watson stat	1.999339
Prob(F-statistic)	0.001026		

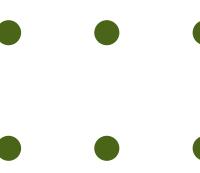
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.317437	0.455333	-5.089547	0.0000
MICROSOFT	0.505201	0.003601	140.2767	0.0000
R-squared	0.928776	Mean dependent var	54.04204	
Adjusted R-squared	0.928728	S.D. dependent var	31.19664	
S.E. of regression	8.328486	Akaike info criterion	7.078563	
Sum squared resid	104669.8	Schwarz criterion	7.085606	
Log likelihood	-5345.854	Hannan-Quinn criter.	7.081186	
F-statistic	19677.56	Durbin-Watson stat	0.013220	
Prob(F-statistic)	0.000000			

Ecuăția de regresie Apple – Microsoft





Grafic Apple - Microsoft



Cointegrale Microsoft – Amazon

Dependent Variable: MICROSOFT

Method: Least Squares

Date: 05/16/21 Time: 20:44

Sample (adjusted): 1 1511

Included observations: 1511 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.968813	0.666167	10.46107	0.0000
AMAZON	0.067522	0.000376	179.6349	0.0000
R-squared	0.955326	Mean dependent var	111.5585	
Adjusted R-squared	0.955296	S.D. dependent var	59.51124	
S.E. of regression	12.58266	Akaike info criterion	7.903839	
Sum squared resid	238909.8	Schwarz criterion	7.910881	
Log likelihood	-5969.350	Hannan-Quinn criter.	7.906461	
F-statistic	32268.71	Durbin-Watson stat	0.020915	
Prob(F-statistic)	0.000000			

Ecuăția de regresie Microsoft - Amazon

Augmented Dickey-Fuller Unit Root Test on UT

Null Hypothesis: UT has a unit root

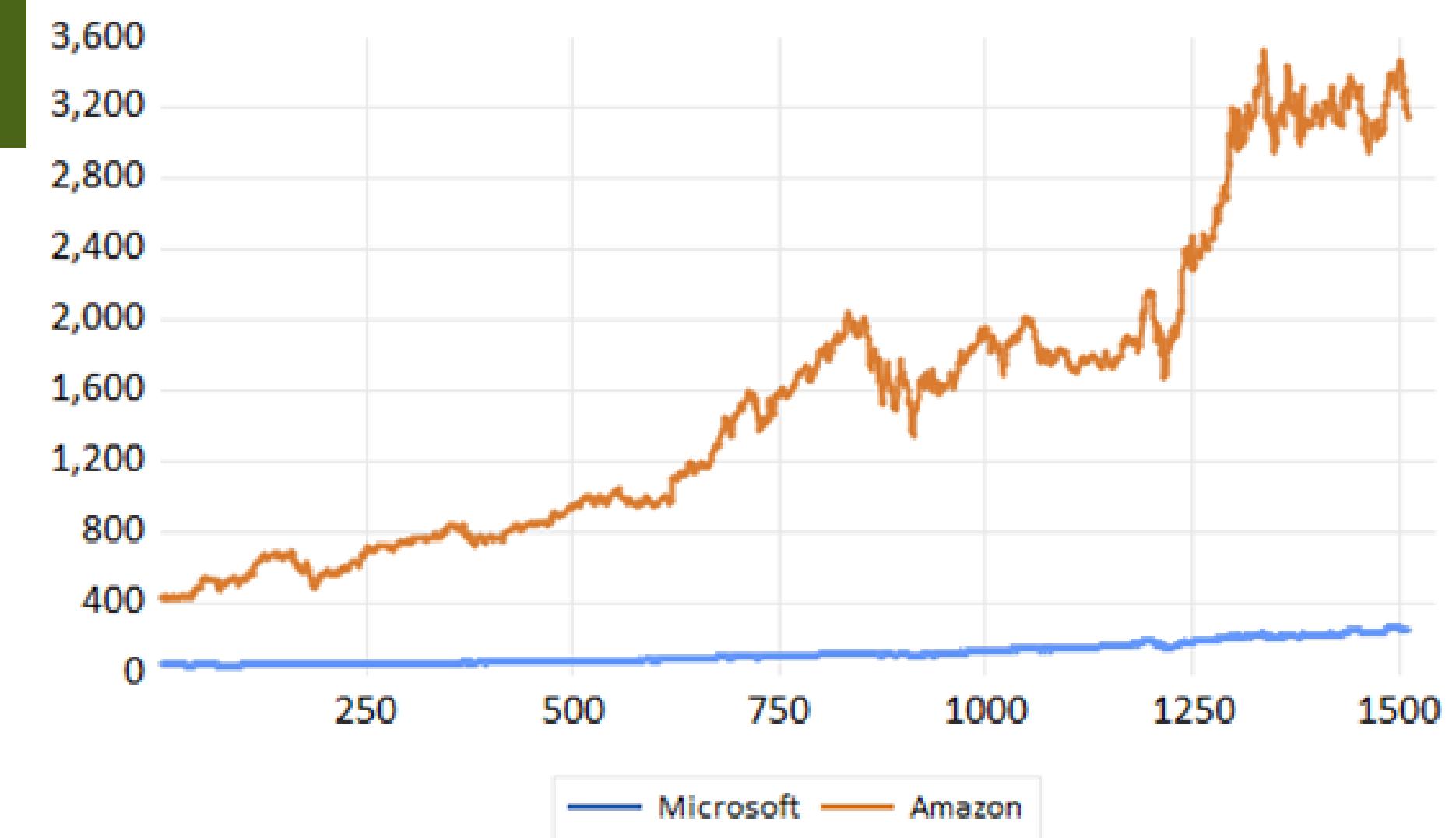
Exogenous: Constant

Lag Length: 1 (Automatic - based on SIC, maxlag=23)

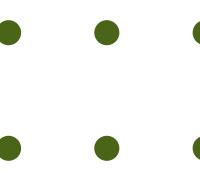
	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.175823	0.2154
Test critical values:		
1% level	-3.434477	
5% level	-2.863250	
10% level	-2.567728	

*MacKinnon (1996) one-sided p-values.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
UT(-1)	-0.008023	0.003687	-2.175823	0.0297
D(UT(-1))	-0.158005	0.025490	-6.198759	0.0000
C	0.007152	0.046199	0.154817	0.8770
R-squared	0.029296	Mean dependent var	0.006644	
Adjusted R-squared	0.028007	S.D. dependent var	1.820288	
S.E. of regression	1.794617	Akaike info criterion	4.009446	
Sum squared resid	4850.298	Schwarz criterion	4.020021	
Log likelihood	-3022.127	Hannan-Quinn criter.	4.013385	
F-statistic	22.72546	Durbin-Watson stat	2.010743	
Prob(F-statistic)	0.000000			



Grafic Microsoft Amazon





Estimare modele VAR (Vectori AutoRegresivi)

Sample (adjusted): 3 1511

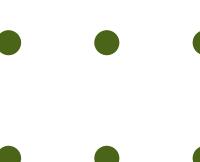
Included observations: 1509 after adjustments

Standard errors in () & t-statistics in []

	AMAZON2	APPLE2	MICROSO...
AMAZON2(-1)	0.027785 (0.03790) [0.73302]	0.002333 (0.00144) [1.61837]	0.006855 (0.00252) [2.72125]
APPLE2(-1)	-0.150079 (1.00873) [-0.14878]	-0.001539 (0.03836) [-0.04012]	0.095202 (0.06703) [1.42020]
MICROSOFT2(-1)	-1.671832 (0.60716) [-2.75351]	-0.120138 (0.02309) [-5.20292]	-0.369948 (0.04035) [-9.16886]
C	1.982510 (0.89803) [2.20763]	0.072520 (0.03415) [2.12343]	0.157629 (0.05968) [2.64136]

R-squared	0.010224	0.031660	0.075595
Adj. R-squared	0.008251	0.029729	0.073752
Sum sq. resids	1825680.	2640.446	8062.383
S.E. equation	34.82924	1.324556	2.314534
F-statistic	5.182175	16.40186	41.02454
Log likelihood	-7496.816	-2563.321	-3405.541
Akaike AIC	9.941439	3.402679	4.518941
Schwarz SC	9.955539	3.416779	4.533041
Mean dependent	1.812770	0.061483	0.129046
S.D. dependent	34.97383	1.344695	2.404915
Determinant resid covariance (dof adj.)	2536.024		
Determinant resid covariance	2515.910		
Log likelihood		-12331.56	
Akaike information criterion		16.35993	
Schwarz criterion		16.40223	
Number of coefficients		12	

Estimare model VAR(1)





Sample: 1 1541
Included observations: 1502

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-12359.47	NA	2829.110	16.46135	16.47196	16.46530
1	-12283.84	150.8557	2588.922	16.37263	16.41509*	16.38844
2	-12277.51	12.60839	2598.130	16.37618	16.45048	16.40386
3	-12253.12	48.45166	2545.436	16.35569	16.46184	16.39523
4	-12233.70	38.51400	2510.347	16.34181	16.47980	16.39321
5	-12225.13	16.95078	2511.799	16.34238	16.51222	16.40565
6	-12183.90	81.41230	2406.294	16.29947	16.50115	16.37460*
7	-12171.34	24.75078*	2394.922*	16.29473*	16.52826	16.38172
8	-12163.80	14.84242	2399.568	16.29667	16.56204	16.39552

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

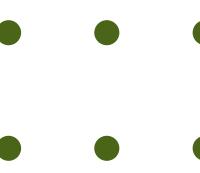
FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Numărul optim de lag-uri al modelului VAR





Cauzalitate Granger

Sample: 1 1541

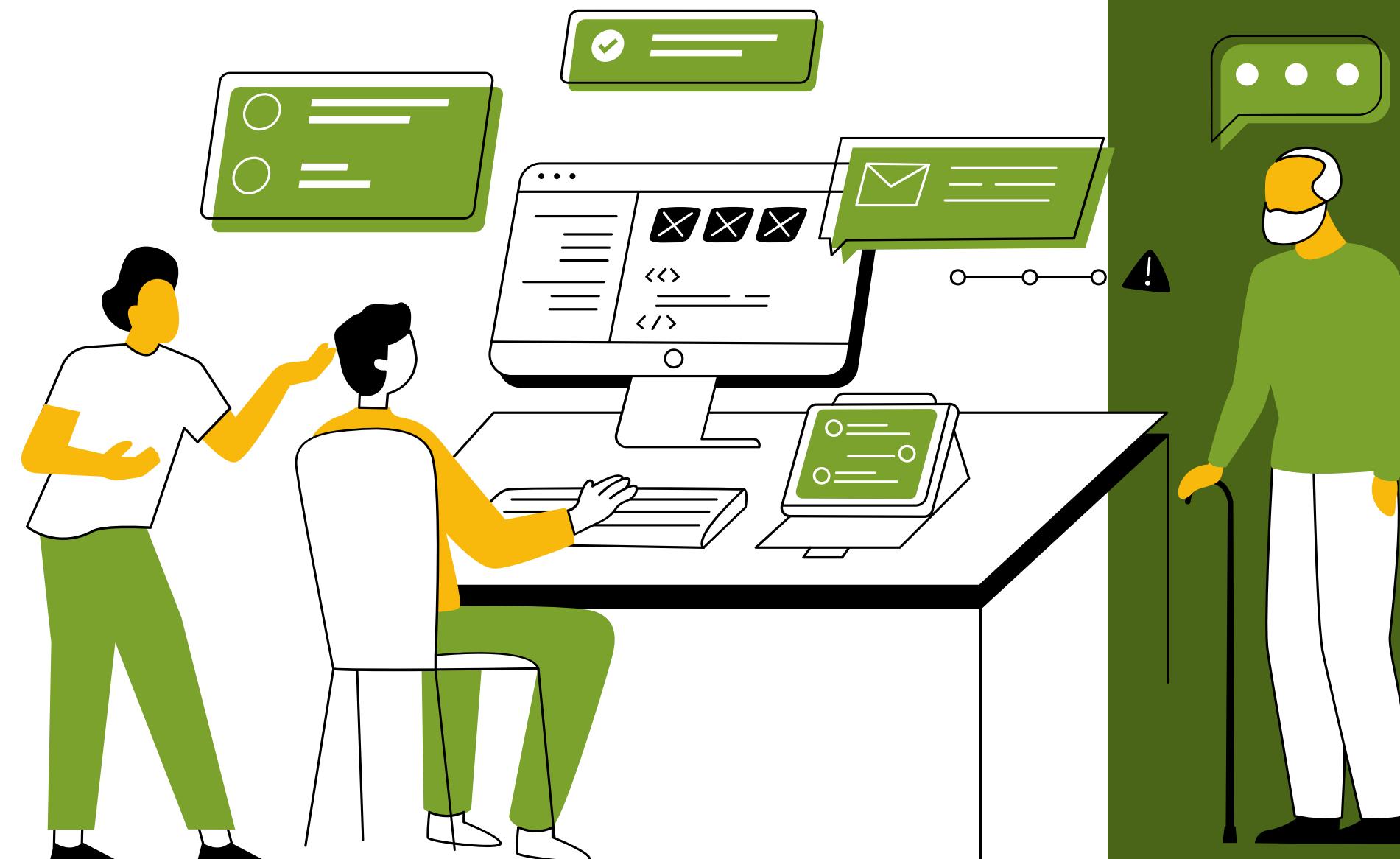
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
APPLE2 does not Granger Cause AMAZON2	1509	2.94423	0.0864
AMAZON2 does not Granger Cause APPLE2		0.68413	0.4083
MICROSOFT2 does not Granger Cause AMAZON2	1509	10.5236	0.0012
AMAZON2 does not Granger Cause MICROSOFT2		10.5934	0.0012
MICROSOFT2 does not Granger Cause APPLE2	1509	25.1202	6.E-07
APPLE2 does not Granger Cause MICROSOFT2		5.19029	0.0229

Testul de cauzalitate Granger



va
multumesc



multumesc

