Ljung-Box test for white noise H0: Logreturns are uncorrelated upto lag 12		
Chi-Square	**df**	**P-Value**
160.041	1	0.000
167.403	2	0.000
167.999	3	0.000
167.999	4	0.000
171.655	5	0.000
171.707	6	0.000
171.911	7	0.000
175.856	8	0.000
177.845	9	0.000
177.851	10	0.000
183.107	11	0.000
183.224	12	0.000

=> respingem ipoteza nula H0: randamentele sunt zgomot alb
=>respingem si faptul ca piata este eficienta in forma slaba

Breusch-Godfrey test for serial correlation H0: there is no serial correlation of any order up to 12		
Chi-Square	**df**	**P-value**
5622.105	12	0.000

resping ipoteza nula p-value =0.000
=> resping ipoteza de random walk

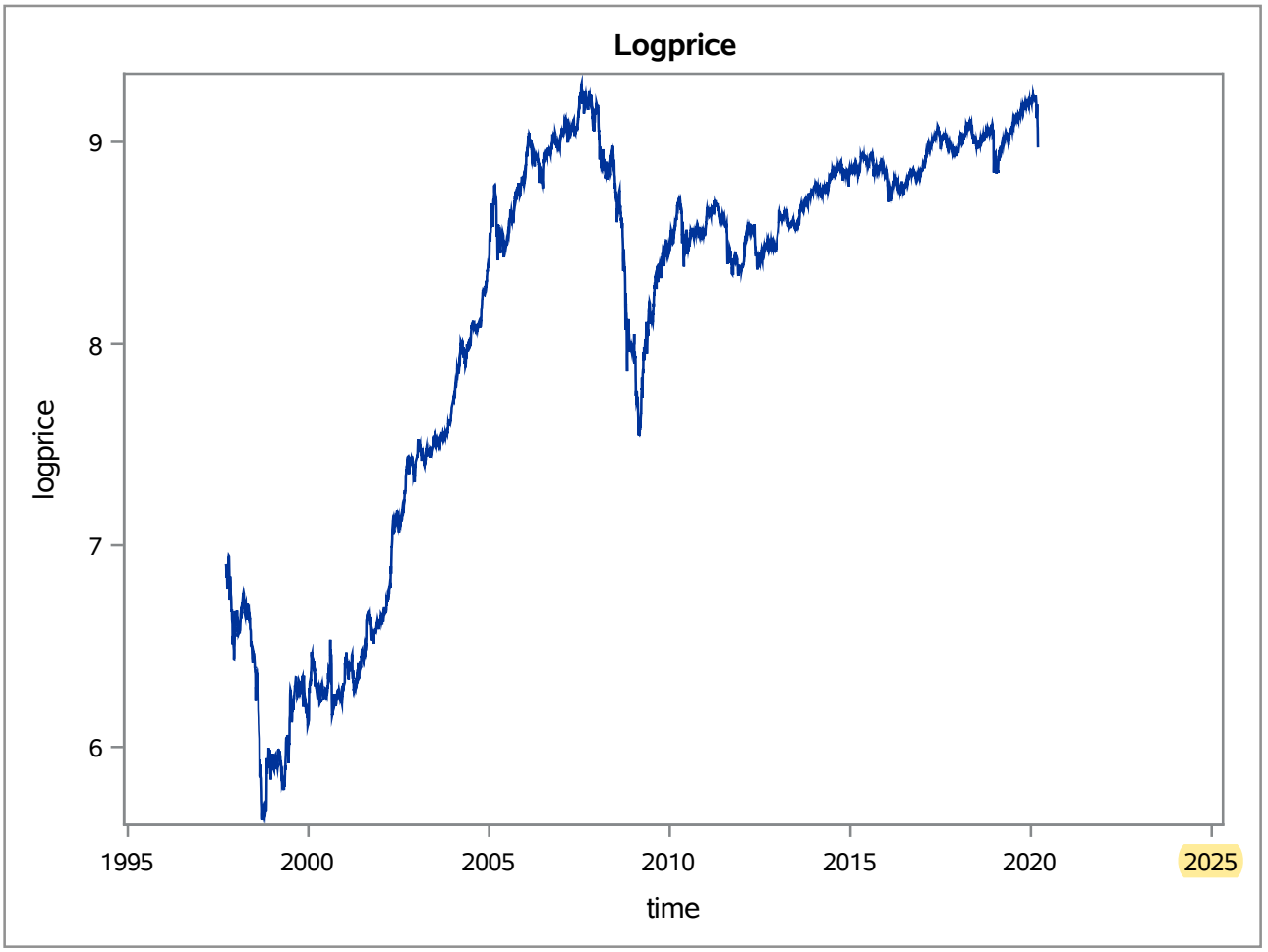
von Neuman rank statistic	Test statistic Z	p-value A	p-value B	p-value C
1.69588	-11.4206	<.000001	1.000000	<.000001

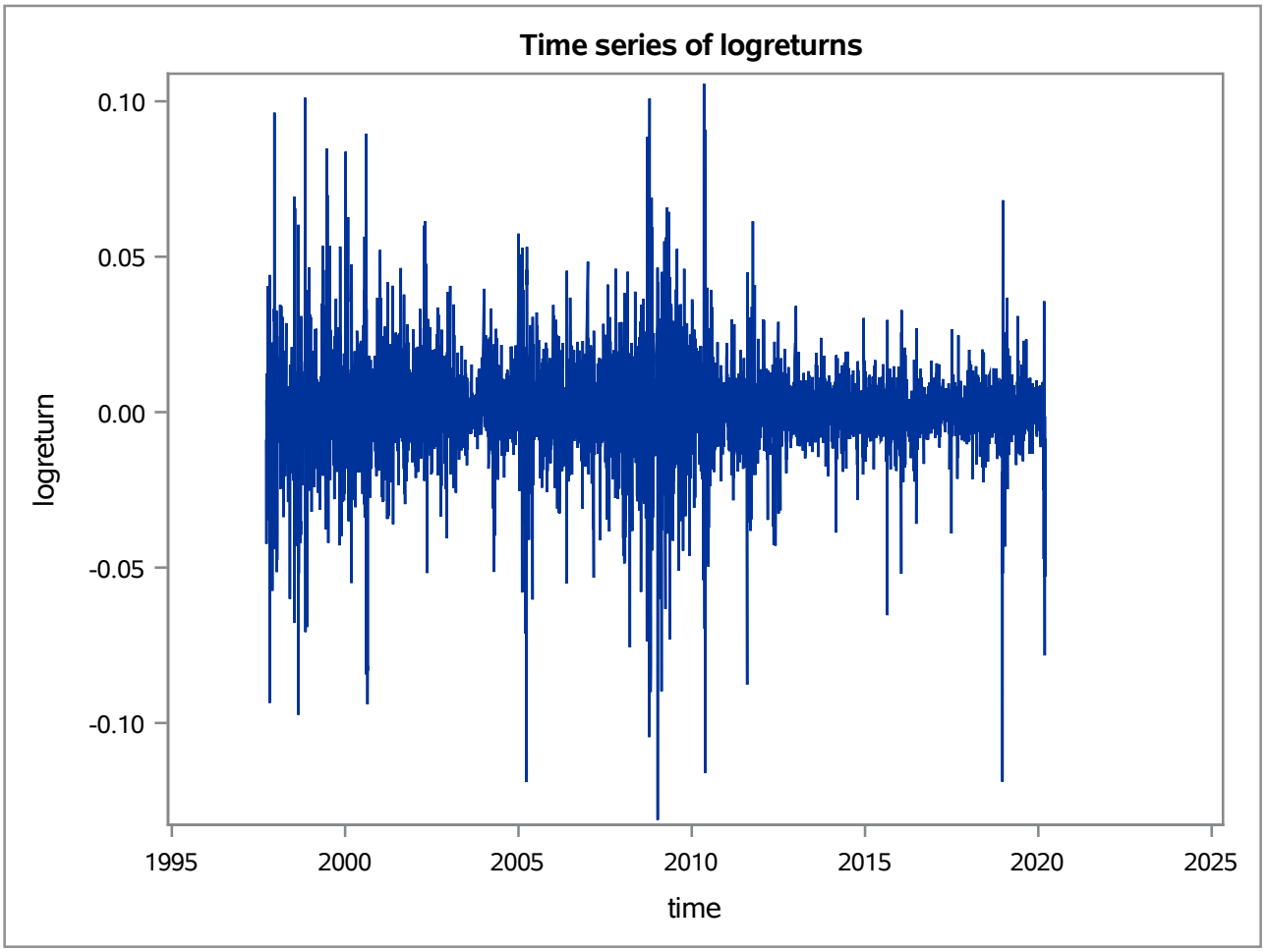
Intrebare: In situatia aceasta de ce avem p-value A,B,C ??

Wald-Wolfowitz Test for Randomness
H0: The data are random

Wald-Wolfowitz Z	Pr > |Z|
-7.51862	<.0001

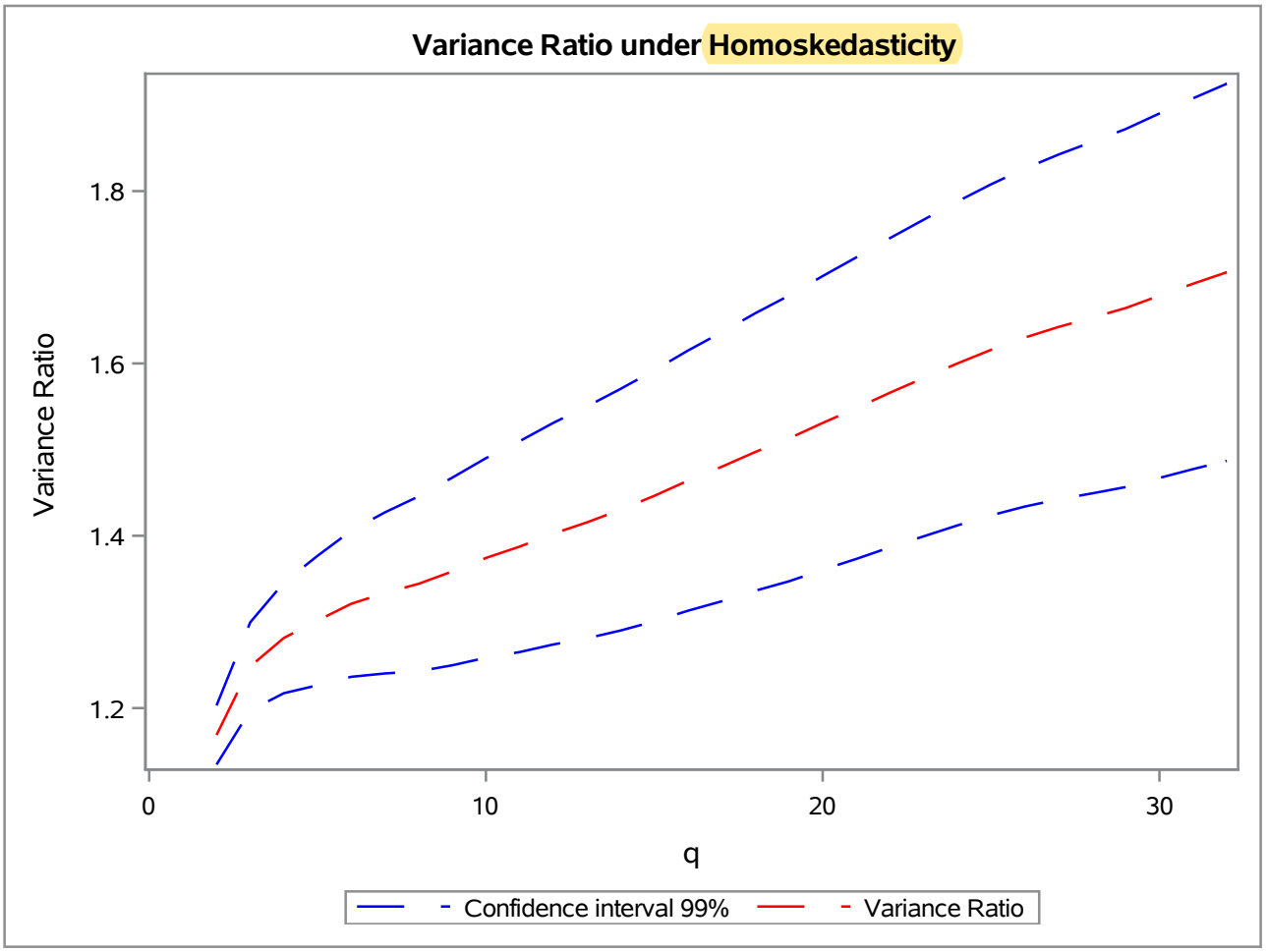
resping ipoteza nula =>nu este zgomot alb


Logprice
logprice
9
8
7
6
1995
2000
2005
2010
2015
2020
2025
time

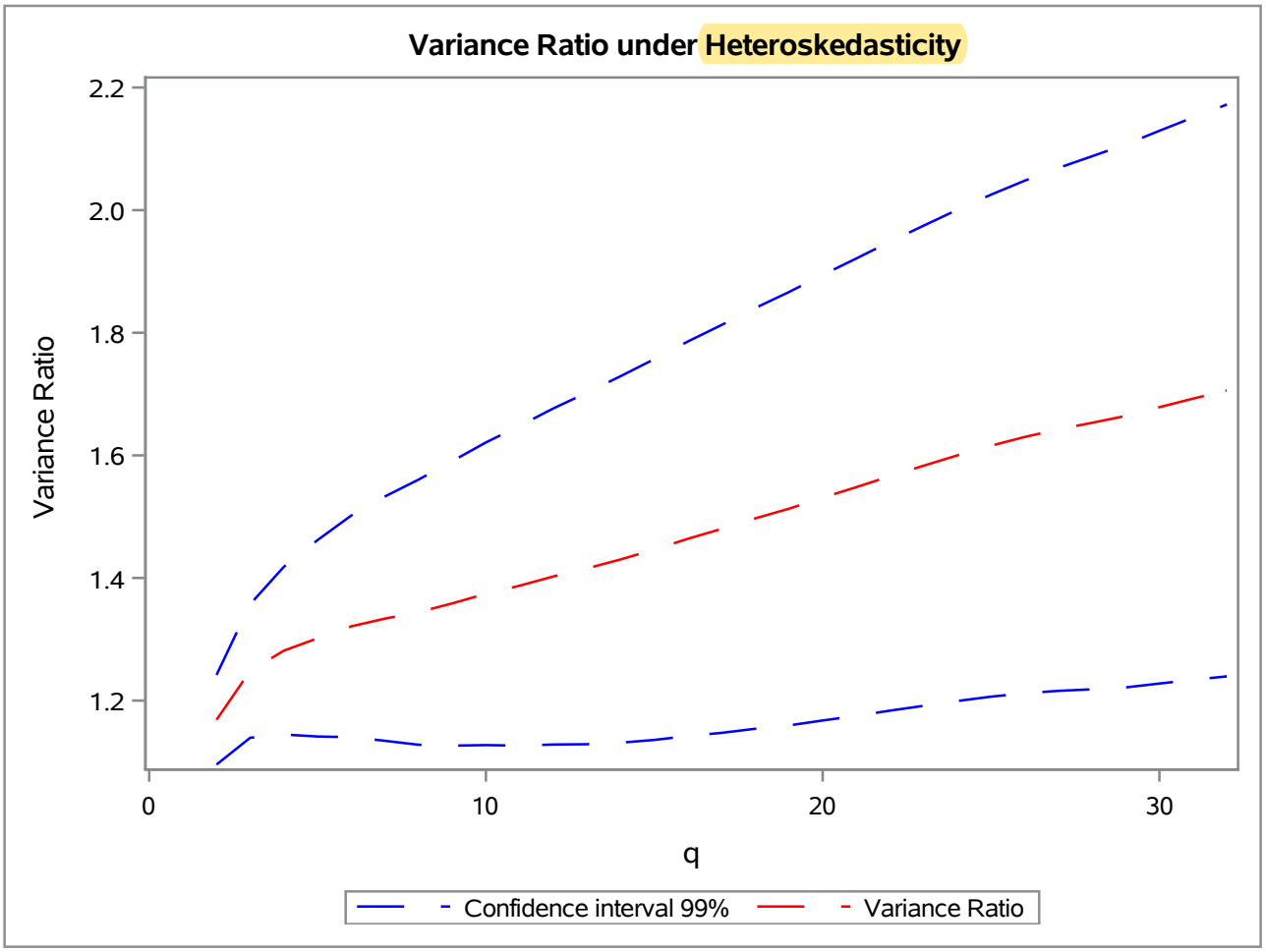

Time series of logreturns
logreturn
0.10
0.05
0.00
-0.05
-0.10
1995
2000
2005
2010
2015
2020
2025
time

Obs	q	nq	VR	z	z_star	z_critic	Decision	lower_homo	upper_homo	lower_hetero	upper_hetero
1	2	5640	1.16873	12.6719	5.94495	2.57583	Reject Homoskedastic and Heteroskedastic RW	1.13443	1.20303	1.09562	1.24184
2	3	5640	1.24837	12.5127	5.87028	2.57583	Reject Homoskedastic and Heteroskedastic RW	1.19724	1.29950	1.13939	1.35736
3	4	5640	1.28144	11.2978	5.30033	2.57583	Reject Homoskedastic and Heteroskedastic RW	1.21728	1.34561	1.14467	1.41822
4	5	5640	1.30160	10.3384	4.85024	2.57583	Reject Homoskedastic and Heteroskedastic RW	1.22646	1.37675	1.14143	1.46178
5	6	5640	1.32107	9.7539	4.57601	2.57583	Reject Homoskedastic and Heteroskedastic RW	1.23628	1.40586	1.14034	1.50180
6	7	5640	1.33367	9.1939	4.31330	2.57583	Reject Homoskedastic and Heteroskedastic RW	1.24019	1.42715	1.13441	1.53293
7	8	5640	1.34419	8.7385	4.09965	2.57583	Reject Homoskedastic and Heteroskedastic RW	1.24274	1.44565	1.12794	1.56045
8	9	5640	1.35855	8.4838	3.98014	2.57583	Reject Homoskedastic and Heteroskedastic RW	1.24969	1.46742	1.12651	1.59060
9	10	5640	1.37423	8.3239	3.90514	2.57583	Reject Homoskedastic and Heteroskedastic RW	1.25843	1.49004	1.12739	1.62108
10	11	5640	1.38736	8.1543	3.82557	2.57583	Reject Homoskedastic and Heteroskedastic RW	1.26500	1.50972	1.12654	1.64818
11	12	5640	1.40242	8.0611	3.78181	2.57583	Reject Homoskedastic and Heteroskedastic RW	1.27383	1.53101	1.12833	1.67651
12	13	5640	1.41554	7.9563	3.73268	2.57583	Reject Homoskedastic and Heteroskedastic RW	1.28101	1.55007	1.12879	1.70230
13	14	5640	1.43026	7.9036	3.70793	2.57583	Reject Homoskedastic and Heteroskedastic RW	1.29003	1.57048	1.13137	1.72915
14	15	5640	1.44635	7.8911	3.70209	2.57583	Reject Homoskedastic and Heteroskedastic RW	1.30065	1.59204	1.13579	1.75690
15	16	5640	1.46399	7.9164	3.71394	2.57583	Reject Homoskedastic and Heteroskedastic RW	1.31302	1.61496	1.14219	1.78579
16	17	5640	1.48003	7.9225	3.71679	2.57583	Reject Homoskedastic and Heteroskedastic RW	1.32396	1.63610	1.14736	1.81270
17	18	5640	1.49725	7.9549	3.73200	2.57583	Reject Homoskedastic and Heteroskedastic RW	1.33624	1.65826	1.15405	1.84045
18	19	5640	1.51296	7.9691	3.73869	2.57583	Reject Homoskedastic and Heteroskedastic RW	1.34716	1.67877	1.15955	1.86638
19	20	5640	1.53093	8.0229	3.76392	2.57583	Reject Homoskedastic and Heteroskedastic RW	1.36047	1.70140	1.16759	1.89428
20	21	5640	1.54812	8.0680	3.78505	2.57583	Reject Homoskedastic and Heteroskedastic RW	1.37312	1.72312	1.17511	1.92113
21	22	5640	1.56606	8.1267	3.81263	2.57583	Reject Homoskedastic and Heteroskedastic RW	1.38664	1.74548	1.18363	1.94850
22	23	5640	1.58308	8.1745	3.83505	2.57583	Reject Homoskedastic and Heteroskedastic RW	1.39935	1.76682	1.19145	1.97472
23	24	5640	1.59996	8.2224	3.85749	2.57583	Reject Homoskedastic and Heteroskedastic RW	1.41201	1.78790	1.19934	2.00057
24	25	5640	1.61579	8.2582	3.87432	2.57583	Reject Homoskedastic and Heteroskedastic RW	1.42372	1.80787	1.20639	2.02520
25	26	5640	1.62999	8.2747	3.88203	2.57583	Reject Homoskedastic and Heteroskedastic RW	1.43388	1.82610	1.21198	2.04801
26	27	5640	1.64231	8.2697	3.87969	2.57583	Reject Homoskedastic and Heteroskedastic RW	1.44225	1.84238	1.21586	2.06876
27	28	5640	1.65312	8.2488	3.86990	2.57583	Reject Homoskedastic and Heteroskedastic RW	1.44917	1.85706	1.21840	2.08783

Obs	q	nq	VR	z	z_star	z_critic	Decision	lower_homo	upper_homo	lower_hetero	upper_hetero
28	29	5640	1.66429	8.2362	3.86398	2.57583	Reject Homoskedastic and Heteroskedastic RW	1.45654	1.87205	1.22146	2.10713
29	30	5640	1.67860	8.2649	3.87744	2.57583	Reject Homoskedastic and Heteroskedastic RW	1.46711	1.89010	1.22780	2.12941
30	31	5640	1.69253	8.2904	3.88942	2.57583	Reject Homoskedastic and Heteroskedastic RW	1.47736	1.90769	1.23389	2.15116
31	32	5640	1.70582	8.3100	3.89861	2.57583	Reject Homoskedastic and Heteroskedastic RW	1.48704	1.92460	1.23948	2.17216



Ca sa fie random walk intervalul de incredere ar trebui sa-l contina pe 1.
=> nu este random walk este semnificativ diferit de 1



Ca sa fie random walk intervalul de incredere ar trebui sa-l contina pe 1.
=> nu este random walk este semnificativ diferit de 1

Concluzia!!!
Indicele bet nu respecta ipoteza de random walk, deci putem respinge ipoteza de piata eficienta in forma slaba