

Lampiran 1. Data Harga Saham dan *Return*

a. Saham Bank Central Asia (BCA)

Data	<i>Return</i>			
7815.47	0	0	0	2.39E-06
7864.63	0.002723	0.001362	0.001362	4.47E-06
7864.63	0	-0.00029	0.000295	6.42E-06
7815.47	-0.00272	-0.00136	-0.00136	7.98E-06
7864.63	0.002723	0.001656	0.001067	9.48E-06
7962.93	0.005395	0.002403	0.002992	1.07E-05
7766.32	-0.01086	-0.00601	-0.00485	1.24E-05
7815.47	0.00274	0.002544	0.000195	1.51E-05
7668.01	-0.00827	-0.00443	-0.00384	1.55E-05
7864.63	0.010996	0.006393	0.004603	1.71E-05
7815.47	-0.00272	-0.00255	-0.00017	1.9E-05
8061.24	0.013447	0.007018	0.006429	1.89E-05
8159.55	0.005264	0.001177	0.004087	2.22E-05
...
...
8750	-0.03402	-0.02061	-0.01341	4.56E-05
8800	0.002475	0.004918	-0.00244	5.67E-05
8800	0	-0.00027	0.000268	5.22E-05
8800	0	0	0	4.77E-05
8800	0	0	0	4.39E-05
8800	0	0	0	4.05E-05
8800	0	0	0	3.76E-05
9450	0.030949	0.015475	0.015475	3.51E-05
9450	0	-0.00335	0.003348	5.24E-05
9200	-0.01164	-0.00582	-0.00582	4.89E-05
9200	0	0.00126	-0.00126	4.76E-05
9050	-0.00714	-0.00357	-0.00357	4.39E-05
9200	0.007139	-0.0028	-0.00434	4.16E-05

Lampiran 1 (lanjutan)

b. Saham Bayan Resources

Data	Return			
19012.19	0	0	0	2.74E-08
18913.68	-0.00226	-0.00113	-0.00113	5.19E-08
18568.9	-0.00799	-0.00372	-0.00427	2.71E-07
18815.17	0.005722	0.003841	0.001881	3.1E-06
18815.17	0	-0.0007	0.000702	3.35E-06
18815.17	0	0	0	3.1E-06
18815.17	0	0	0	2.81E-06
18371.89	-0.01035	-0.00518	-0.00518	2.54E-06
18224.12	-0.00351	-0.00048	-0.00302	6.45E-06
18224.12	0	0.00043	-0.00043	7.22E-06
18027.1	-0.00472	-0.00236	-0.00236	6.52E-06
17977.85	-0.00119	-1.5E-05	-0.00117	6.73E-06
17928.6	-0.00119	-0.00045	-0.00074	6.27E-06
...
...
9650	0	0.001631	-0.00163	6.68E-05
9650	0	0	0	6.03E-05
9650	0	0	0	5.4E-05
9750	0.004477	0.002239	0.002239	4.84E-05
9750	0	-0.00055	0.000549	4.42E-05
9750	0	0	0	3.96E-05
9750	0	0	0	3.55E-05
9500	-0.01128	-0.00564	-0.00564	3.18E-05
9500	0	0.001384	-0.00138	3.35E-05
9250	-0.01158	-0.00579	-0.00579	3.03E-05
9250	0	0.001421	-0.00142	3.24E-05
8550	-0.03418	-0.01709	-0.01709	2.93E-05
8750	0.010042	0.009213	0.000829	7.15E-05

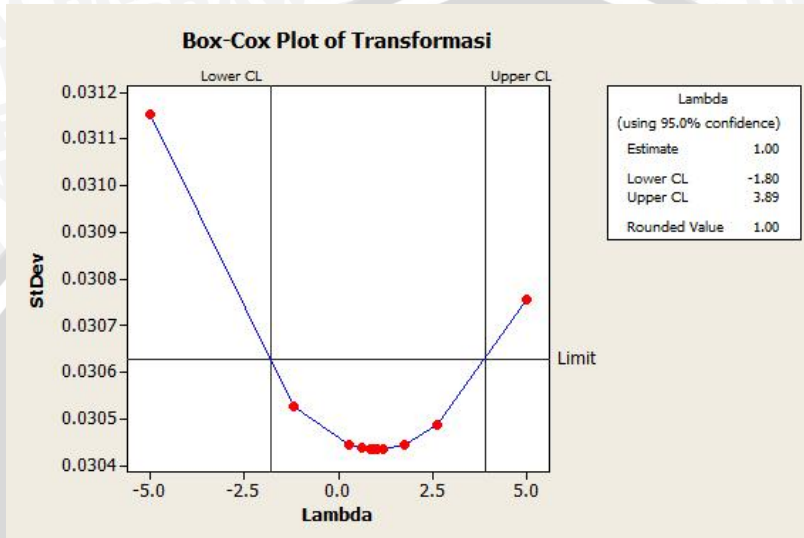
Lampiran 1 (lanjutan)

c. Saham Lippo Cikarang

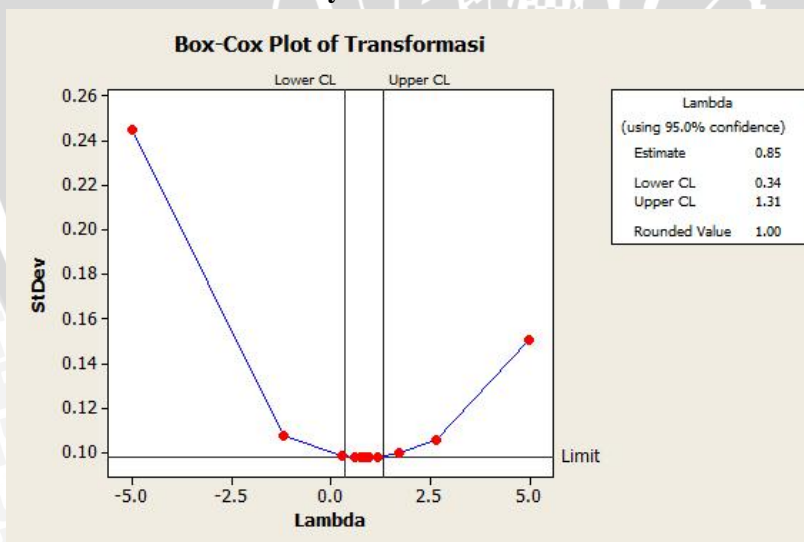
Data	Return			
1800	0	0	0	0.000034
1820	0.004799	0.002399	0.002399	6.45E-05
1920	-0.02323	0.011026	0.012204	9.26E-05
1880	-0.00914	-0.00742	-0.00172	0.00014
2000	0.026872	0.014558	0.012314	0.00016
2025	0.005395	-0.0006	0.005994	0.000201
1940	-0.01862	-0.00997	-0.00865	0.000219
1930	-0.00224	0.001162	-0.00341	0.000242
1810	-0.02788	-0.01366	-0.01421	0.000252
1940	0.030123	0.018481	0.011642	0.000291
1860	-0.01829	-0.01284	-0.00545	0.000316
1880	0.004645	0.004566	7.9E-05	0.000322
1840	-0.00934	-0.00524	-0.0041	0.000322
...
...
3275	0.003328	0.002879	0.000449	0.000356
3300	0.003303	0.001243	0.00206	0.000352
3250	-0.00663	-0.00372	-0.00291	0.00035
3600	0.044419	0.023023	0.021396	0.000349
3600	0	-0.00545	0.005449	0.000417
3600	0	0	0	0.000413
3600	0	0	0	0.000403
3375	-0.02803	-0.01401	-0.01401	0.000395
3375	0	0.003438	-0.00344	0.000418
3400	0.003205	0.001603	0.001603	0.000411
3400	0	-0.00039	0.000393	0.000402
3250	-0.0196	-0.0098	-0.0098	0.000394
3200	-0.00673	-0.00096	-0.00577	0.000402

Lampiran 2. Hasil Transformasi Box-Cox

a. Data Return Saham BCA

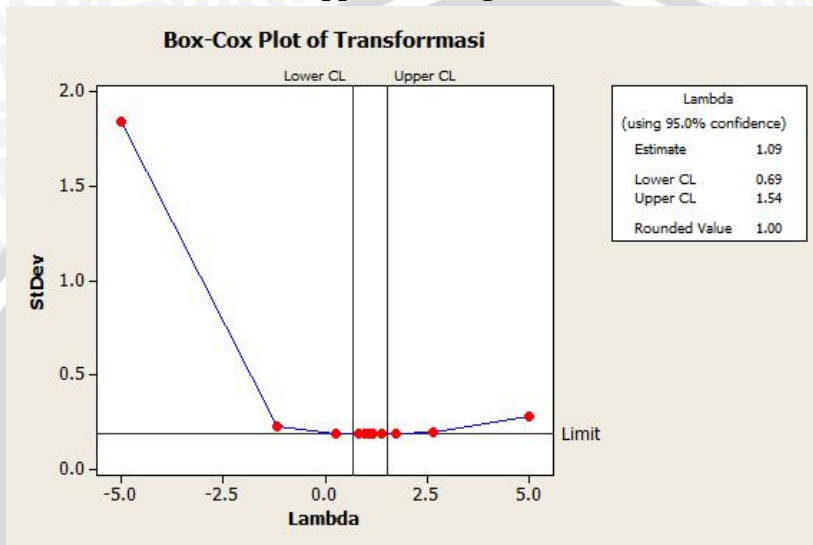


b. Data Return Saham Bayan Resources



Lampiran 2 (lanjutan)

c. Data Return Saham Lippo Cikarang



Lampiran 3. Uji ADF

a. Saham BCA

Null Hypothesis: RETURN has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic based on SIC, MAXLAG=5)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-22.09992	0.0000
Test critical values:		
1% level	-3.989048	
5% level	-3.424926	
10% level	-3.135554	

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

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(RETURN)

Method: Least Squares

Date: 12/25/12 Time: 23:28

Sample(adjusted): 2 300

Included observations: 299 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RETURN(-1)	-1.246375	0.056397	-22.09992	0.0000
C	-0.000573	0.000760	-0.753811	0.4516
@TREND(1)	5.69E-06	4.39E-06	1.294228	0.1966
R-squared	0.622655	Mean dependent var		1.48E-05
Adjusted R-squared	0.620105	S.D. dependent var		0.010623
S.E. of regression	0.006548	Akaike info criterion		-7.209428
Sum squared resid	0.012690	Schwarz criterion		-7.172300
Log likelihood	1080.809	F-statistic		244.2136
Durbin-Watson stat	2.019140	Prob(F-statistic)		0.000000

Lampiran 3(lanjutan)

b. Saham Bayan Resources

Null Hypothesis: RETURN has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic based on SIC, MAXLAG=5)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-21.78551	0.0000
Test critical values:		
1% level	-3.989048	
5% level	-3.424926	
10% level	-3.135554	

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

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(RETURN)

Method: Least Squares

Date: 01/06/13 Time: 22:21

Sample(adjusted): 2 300

Included observations: 299 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RETURN(-1)	-1.234714	0.056676	-21.78551	0.0000
C	-0.000403	0.001015	-0.396724	0.6919
@TREND(1)	-6.60E-06	5.87E-06	-1.122712	0.2625
R-squared	0.615894	Mean dependent var		4.11E-05
Adjusted R-squared	0.613299	S.D. dependent var		0.014077
S.E. of regression	0.008754	Akaike info criterion		-6.628681
Sum squared resid	0.022682	Schwarz criterion		-6.591553
Log likelihood	993.9878	F-statistic		237.3108
Durbin-Watson stat	1.983827	Prob(F-statistic)		0.000000

Lampiran 3 (lanjutan)

c. Saham Lippo Cikarang

Null Hypothesis: RETURN has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic based on SIC, MAXLAG=5)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-19.77569	0.0000
Test critical values:		
1% level	-3.989048	
5% level	-3.424926	
10% level	-3.135554	

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

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(RETURN)

Method: Least Squares

Date: 12/27/12 Time: 00:09

Sample(adjusted): 2 300

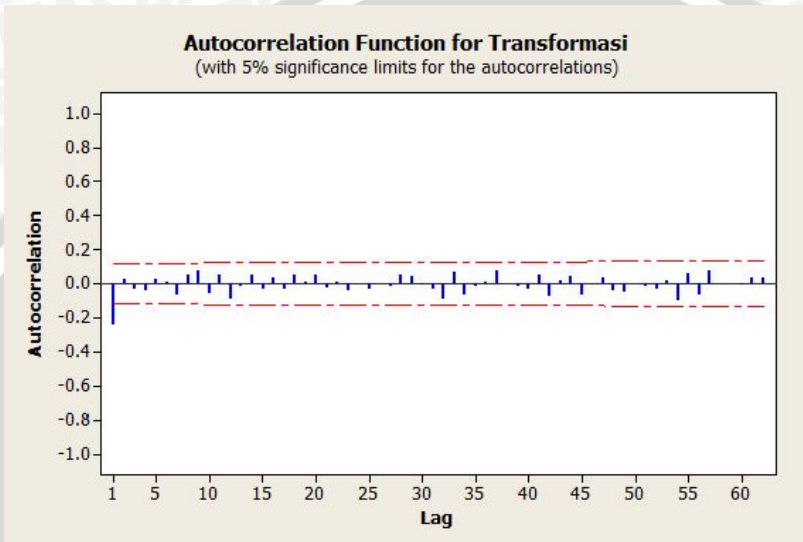
Included observations: 299 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RETURN(-1)	-1.138632	0.057577	-19.77569	0.0000
C	0.002259	0.001724	1.310020	0.1912
@TREND(1)	-8.80E-06	9.95E-06	-0.884426	0.3772
R-squared	0.569190	Mean dependent var		-3.86E-05
Adjusted R-squared	0.566280	S.D. dependent var		0.022528
S.E. of regression	0.014837	Akaike info criterion		-5.573467
Sum squared resid	0.065156	Schwarz criterion		-5.536339
Log likelihood	836.2334	F-statistic		195.5392
Durbin-Watson stat	1.988132	Prob(F-statistic)		0.000000

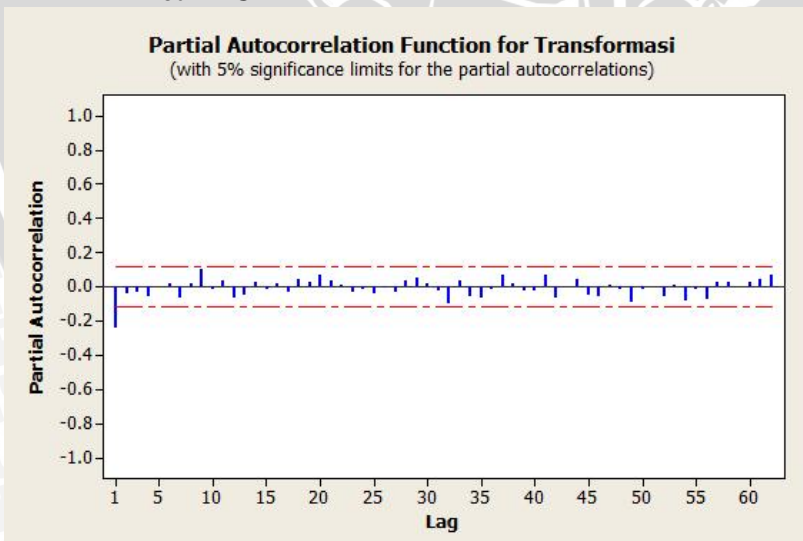
Lampiran 4. Plot ACF dan PACF

a. Saham BCA

- Plot ACF



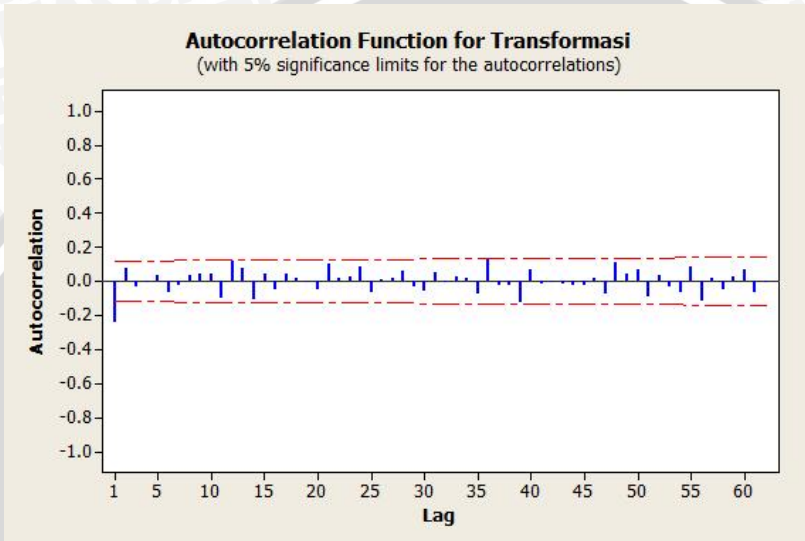
- Plot PACF



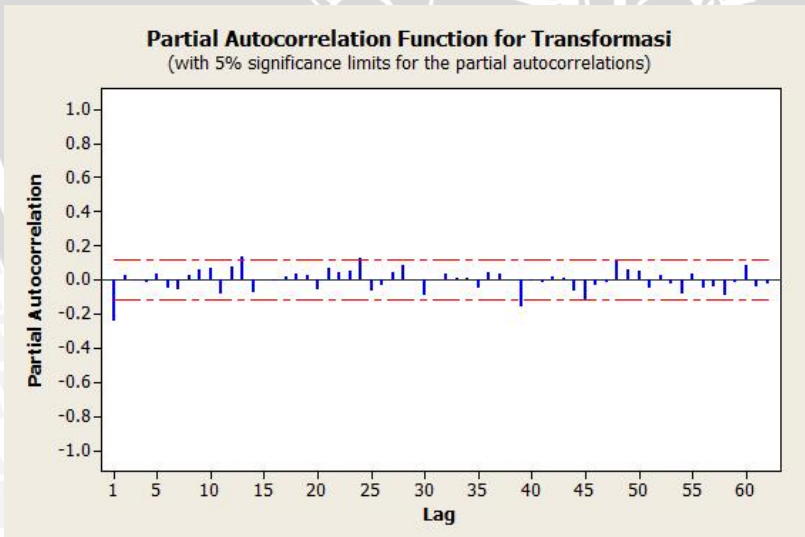
Lampiran 4 (lanjutan)

b. Saham Bayan Resources

- **Plot ACF**



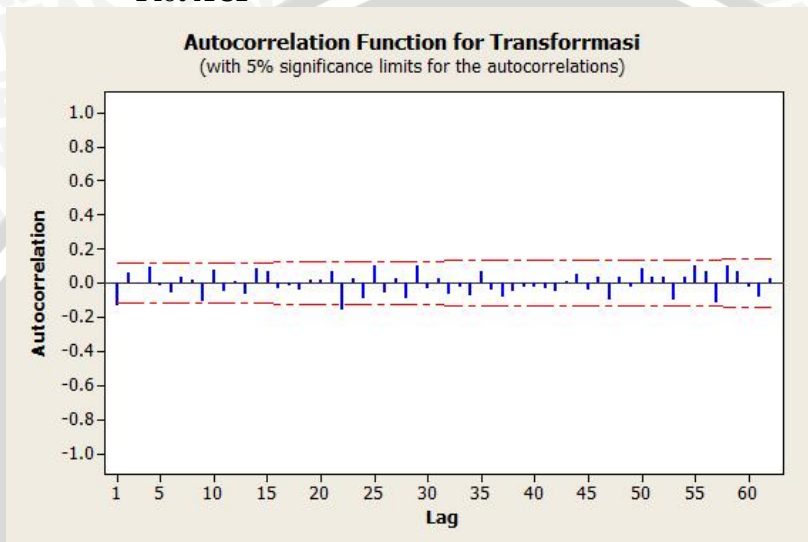
- **Plot PACF**



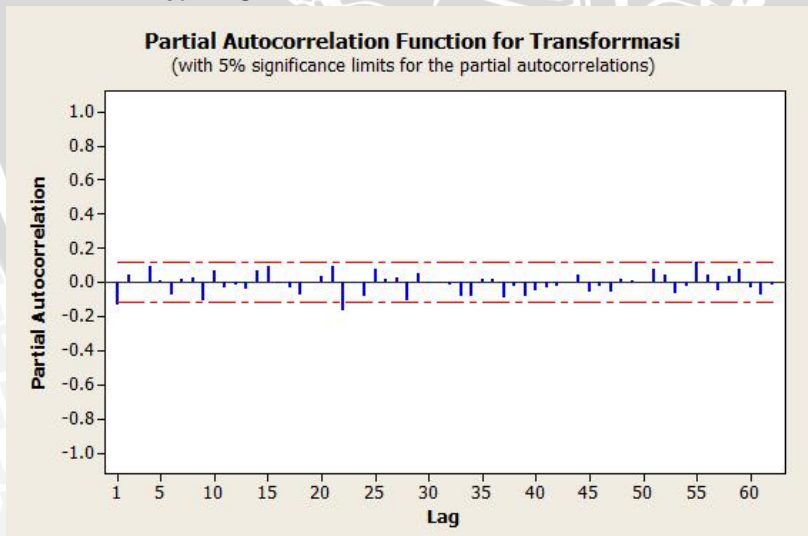
Lampiran 4 (lanjutan)

c. Saham Lippo Cikarang

- Plot ACF



- Plot PACF



Lampiran 5. Model ARIMA

a. Saham BCA

- **Model AR (1)**

Dependent Variable: RETURN

Method: Least Squares

Date: 01/12/13 Time: 14:43

Sample(adjusted): 2 300

Included observations: 299 after adjusting endpoints

Convergence achieved after 3 iterations

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AR(1)	-0.241260	0.056313	-4.284251	0.0000
R-squared	0.056942	Mean dependent var		0.000228
Adjusted R-squared	0.056942	S.D. dependent var		0.006745
S.E. of regression	0.006550	Akaike info criterion		-7.215336
Sum squared resid	0.012785	Schwarz criterion		-7.202960
Log likelihood	1079.693	Durbin-Watson stat		2.013882
Inverted AR Roots	-0.24			

- **Model MA (1)**

Dependent Variable: RETURN

Method: Least Squares

Date: 01/12/13 Time: 14:28

Sample: 1 300

Included observations: 300

Convergence achieved after 4 iterations

Backcast: 0

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MA(1)	-0.250345	0.056006	-4.469930	0.0000
R-squared	0.058366	Mean dependent var		0.000236
Adjusted R-squared	0.058366	S.D. dependent var		0.006735
S.E. of regression	0.006536	Akaike info criterion		-7.219751
Sum squared resid	0.012772	Schwarz criterion		-7.207405
Log likelihood	1083.963	Durbin-Watson stat		2.000107
Inverted MA Roots	.25			

Lampiran 5 (lanjutan)

- **Model ARMA (1,1)**

Dependent Variable: RETURN

Method: Least Squares

Date: 01/12/13 Time: 14:27

Sample(adjusted): 2 300

Included observations: 299 after adjusting endpoints

Convergence achieved after 13 iterations

Backcast: 1

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AR(1)	-0.046580	0.232450	-0.200386	0.8413
MA(1)	-0.205155	0.227643	-0.901213	0.3682
R-squared	0.058482	Mean dependent var		0.000228
Adjusted R-squared	0.055312	S.D. dependent var		0.006745
S.E. of regression	0.006556	Akaike info criterion		-7.210282
Sum squared resid	0.012764	Schwarz criterion		-7.185530
Log likelihood	1079.937	Durbin-Watson stat		1.996926
Inverted AR Roots	-.05			
Inverted MA Roots	.21			

b. Saham Bayan Resources

- **Model AR (1)**

Dependent Variable: RETURN

Method: Least Squares

Date: 01/12/13 Time: 14:45

Sample(adjusted): 2 300

Included observations: 299 after adjusting endpoints

Convergence achieved after 3 iterations

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AR(1)	-0.211305	0.056737	-3.724301	0.0002
R-squared	0.029587	Mean dependent var		-0.001120
Adjusted R-squared	0.029587	S.D. dependent var		0.008985
S.E. of regression	0.008851	Akaike info criterion		-6.613248
Sum squared resid	0.023345	Schwarz criterion		-6.600872
Log likelihood	989.6806	Durbin-Watson stat		1.975287
Inverted AR Roots	-.21			

Lampiran 5 (lanjutan)

- **Model MA (1)**

Dependent Variable: RETURN
 Method: Least Squares
 Date: 01/12/13 Time: 14:45
 Sample: 1 300
 Included observations: 300
 Convergence achieved after 8 iterations
 Backcast: 0

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MA(1)	-0.185660	0.056834	-3.266714	0.0012
R-squared	0.023831	Mean dependent var		-0.001123
Adjusted R-squared	0.023831	S.D. dependent var		0.008970
S.E. of regression	0.008863	Akaike info criterion		-6.610641
Sum squared resid	0.023485	Schwarz criterion		-6.598295
Log likelihood	992.5962	Durbin-Watson stat		2.031893
Inverted MA Roots	.19			

- **Model ARMA (1,1)**

Dependent Variable: RETURN
 Method: Least Squares
 Date: 01/12/13 Time: 14:45
 Sample(adjusted): 2 300
 Included observations: 299 after adjusting endpoints
 Convergence achieved after 8 iterations
 Backcast: 1

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AR(1)	-0.441717	0.237930	-1.856503	0.0644
MA(1)	0.240735	0.256115	0.939949	0.3480
R-squared	0.032286	Mean dependent var		-0.001120
Adjusted R-squared	0.029028	S.D. dependent var		0.008985
S.E. of regression	0.008853	Akaike info criterion		-6.609344
Sum squared resid	0.023280	Schwarz criterion		-6.584592
Log likelihood	990.0969	Durbin-Watson stat		1.996754
Inverted AR Roots	-.44			
Inverted MA Roots	-.24			

Lampiran 5 (lanjutan)

c. Saham Lippo Cikarang

- **Model AR (1)**

Dependent Variable: RETURN

Method: Least Squares

Date: 01/12/13 Time: 15:02

Sample(adjusted): 2 300

Included observations: 299 after adjusting endpoints

Convergence achieved after 3 iterations

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AR(1)	-0.132816	0.057425	-2.312851	0.0214
R-squared	0.014670	Mean dependent var		0.000820
Adjusted R-squared	0.014670	S.D. dependent var		0.014946
S.E. of regression	0.014836	Akaike info criterion		-5.580211
Sum squared resid	0.065590	Schwarz criterion		-5.567835
Log likelihood	835.2416	Durbin-Watson stat		1.986880
Inverted AR Roots	-.13			

- **Model MA (1)**

Dependent Variable: RETURN

Method: Least Squares

Date: 01/12/13 Time: 15:02

Sample: 1 300

Included observations: 300

Convergence achieved after 6 iterations

Backcast: 0

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MA(1)	-0.124442	0.057439	-2.166516	0.0311
R-squared	0.013467	Mean dependent var		0.000833
Adjusted R-squared	0.013467	S.D. dependent var		0.014923
S.E. of regression	0.014822	Akaike info criterion		-5.582116
Sum squared resid	0.065686	Schwarz criterion		-5.569770
Log likelihood	838.3173	Durbin-Watson stat		2.009126
Inverted MA Roots	.12			

Lampiran 5 (lanjutan)

- **Model ARMA (1,1)**

Dependent Variable: RETURN

Method: Least Squares

Date: 01/12/13 Time: 15:01

Sample(adjusted): 2 300

Included observations: 299 after adjusting endpoints

Convergence achieved after 38 iterations

Backcast: 1

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AR(1)	-0.721812	0.213337	-3.383442	0.0008
MA(1)	0.622778	0.241767	2.575944	0.0105
R-squared	0.021924	Mean dependent var		0.000820
Adjusted R-squared	0.018631	S.D. dependent var		0.014946
S.E. of regression	0.014806	Akaike info criterion		-5.580912
Sum squared resid	0.065107	Schwarz criterion		-5.556160
Log likelihood	836.3464	Durbin-Watson stat		2.041727

Lampiran 6. Keberadaan Efek GARCH

a. Saham BCA

ARCH Test:

F-statistic	2.446642	Probability	0.000037
Obs*R-squared	73.80016	Probability	0.000207

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 01/07/13 Time: 14:12

Sample(adjusted): 37 300

Included observations: 264 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.65E-05	1.89E-05	2.455796	0.0148
RESID^2(-1)	0.279917	0.066283	4.223037	0.0000
RESID^2(-2)	-0.061825	0.068807	-0.898529	0.3699
RESID^2(-3)	-0.128165	0.071312	-1.797248	0.0736
RESID^2(-4)	0.056869	0.071787	0.792183	0.4291
RESID^2(-5)	-0.045387	0.073780	-0.615163	0.5391
RESID^2(-6)	-0.151961	0.081024	-1.875512	0.0620
RESID^2(-7)	0.254447	0.082598	3.080552	0.0023
...
...
RESID^2(-30)	-0.049851	0.136789	-0.364440	0.7159
RESID^2(-31)	-0.177375	0.136287	-1.301479	0.1944
RESID^2(-32)	0.079105	0.136664	0.578831	0.5633
RESID^2(-33)	0.050429	0.136474	0.369516	0.7121
RESID^2(-34)	0.030317	0.136811	0.221594	0.8248
RESID^2(-35)	-0.081803	0.136669	-0.598544	0.5501
RESID^2(-36)	-0.099548	0.136853	-0.727407	0.4677
R-squared	0.279546	Mean dependent var	4.52E-05	
Adjusted R-squared	0.165289	S.D. dependent var	0.000127	
S.E. of regression	0.000116	Akaike info criterion	-15.15868	
Sum squared resid	3.05E-06	Schwarz criterion	-14.65750	
Log likelihood	2037.946	F-statistic	2.446642	
Durbin-Watson stat	1.993190	Prob(F-statistic)	0.000037	

Lampiran 6 (lanjutan)

b. Saham Bayan Resources

ARCH Test:

F-statistic	2.054530	Probability	0.000841
Obs*R-squared	64.87924	Probability	0.002222

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 01/07/13 Time: 14:44

Sample(adjusted): 37 300

Included observations: 264 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.05E-05	2.53E-05	1.602665	0.1104
RESID^2(-1)	0.238116	0.066520	3.579592	0.0004
RESID^2(-2)	-0.057880	0.070377	-0.822435	0.4117
RESID^2(-3)	0.025314	0.070599	0.358567	0.7203
RESID^2(-4)	0.028116	0.068483	0.410550	0.6818
RESID^2(-5)	0.023834	0.067421	0.353506	0.7240
RESID^2(-6)	0.186719	0.067442	2.768582	0.0061
RESID^2(-7)	0.061449	0.069492	0.884263	0.3775
...
...
RESID^2(-30)	-0.023803	0.086846	-0.274079	0.7843
RESID^2(-31)	0.033311	0.084478	0.394308	0.6937
RESID^2(-32)	-0.247350	0.084436	-2.929442	0.0037
RESID^2(-33)	0.274494	0.086087	3.188564	0.0016
RESID^2(-34)	-0.100039	0.087981	-1.137061	0.2567
RESID^2(-35)	0.089589	0.089791	0.997745	0.3195
RESID^2(-36)	0.029815	0.085882	0.347165	0.7288
R-squared	0.245755	Mean dependent var	8.88E-05	
Adjusted R-squared	0.126139	S.D. dependent var	0.000313	
S.E. of regression	0.000292	Akaike info criterion	-13.30792	
Sum squared resid	1.94E-05	Schwarz criterion	-12.80674	
Log likelihood	1793.645	F-statistic	2.054530	
Durbin-Watson stat	1.997192	Prob(F-statistic)	0.000841	

Lampiran 6 (lanjutan)

c. Saham Lippo Cikarang

ARCH Test:

F-statistic	2.007687	Probability	0.001203
Obs*R-squared	63.75723	Probability	0.002941

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 12/27/12 Time: 01:23

Sample(adjusted): 37 300

Included observations: 264 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9.09E-05	6.92E-05	1.314467	0.1900
RESID^2(-1)	0.055364	0.066378	0.834069	0.4051
RESID^2(-2)	0.019161	0.066316	0.288928	0.7729
RESID^2(-3)	-0.040528	0.066218	-0.612037	0.5411
RESID^2(-4)	0.262617	0.065171	4.029632	0.0001
RESID^2(-5)	-0.056132	0.067435	-0.832394	0.4061
RESID^2(-6)	-0.001845	0.066896	-0.027583	0.9780
RESID^2(-7)	0.025961	0.066793	0.388670	0.6979
...
...
RESID^2(-30)	-0.049581	0.067108	-0.738819	0.4608
RESID^2(-31)	0.071427	0.067198	1.062921	0.2889
RESID^2(-32)	0.013066	0.067213	0.194403	0.8460
RESID^2(-33)	-0.178860	0.065057	-2.749285	0.0065
RESID^2(-34)	0.023435	0.066099	0.354547	0.7233
RESID^2(-35)	-0.051866	0.066190	-0.783595	0.4341
RESID^2(-36)	0.002584	0.066198	0.039030	0.9689
R-squared	0.241505	Mean dependent var	0.000220	
Adjusted R-squared	0.121215	S.D. dependent var	0.000757	
S.E. of regression	0.000710	Akaike info criterion	-11.53464	
Sum squared resid	0.000114	Schwarz criterion	-11.03347	
Log likelihood	1559.573	F-statistic	2.007687	
Durbin-Watson stat	1.999944	Prob(F-statistic)	0.001203	

Lampiran 7. Model GARCH

a. Saham BCA

- **Model ARCH (1)**

Dependent Variable: RETURN
 Method: ML - ARCH (Marquardt)
 Date: 01/12/13 Time: 14:31
 Sample(adjusted): 2 300
 Included observations: 299 after adjusting endpoints
 Convergence achieved after 15 iterations
 Variance backcast: ON

	Coefficient	Std. Error	z-Statistic	Prob.
AR(1)	-0.215055	0.075193	-2.860025	0.0042
Variance Equation				
C	3.86E-05	2.27E-06	17.02326	0.0000
ARCH(1)	0.086950	0.042461	2.047776	0.0406
R-squared	0.056256	Mean dependent var		0.000228
Adjusted R-squared	0.049880	S.D. dependent var		0.006745
S.E. of regression	0.006575	Akaike info criterion		-7.296854
Sum squared resid	0.012795	Schwarz criterion		-7.189726
Log likelihood	1083.415	Durbin-Watson stat		2.064547
Inverted AR Roots	-.22			

- **Model GARCH (1,1)**

Dependent Variable: RETURN
 Method: ML - ARCH (Marquardt)
 Date: 01/12/13 Time: 14:30
 Sample(adjusted): 2 300
 Included observations: 299 after adjusting endpoints
 Convergence achieved after 22 iterations
 Variance backcast: ON

	Coefficient	Std. Error	z-Statistic	Prob.
AR(1)	-0.216362	0.067855	-3.188584	0.0014
Variance Equation				
C	2.39E-06	1.14E-06	2.090815	0.0365
ARCH(1)	0.081719	0.028834	2.834154	0.0046
GARCH(1)	0.869058	0.047427	18.32407	0.0000
R-squared	0.056323	Mean dependent var		0.000228
Adjusted R-squared	0.046726	S.D. dependent var		0.006745
S.E. of regression	0.006585	Akaike info criterion		-7.272484
Sum squared resid	0.012794	Schwarz criterion		-7.222979
Log likelihood	1091.236	Durbin-Watson stat		2.062008
Inverted AR Roots	-.22			

Lampiran 7 (lanjutan)

b. Saham Bayan Resources

- **Model ARCH (1)**

Dependent Variable: RETURN
 Method: ML - ARCH (Marquardt)
 Date: 01/12/13 Time: 14:48
 Sample: 1 300
 Included observations: 300
 Convergence achieved after 52 iterations
 MA backcast: 0, Variance backcast: ON

	Coefficient	Std. Error	z-Statistic	Prob.
MA(1)	-0.142557	0.085406	-1.669166	0.0951
Variance Equation				
C	6.69E-05	2.11E-06	31.66913	0.0000
ARCH(1)	0.137206	0.059891	2.290938	0.0220
R-squared	0.021663	Mean dependent var		-0.001123
Adjusted R-squared	0.015075	S.D. dependent var		0.008970
S.E. of regression	0.008902	Akaike info criterion		-6.656990
Sum squared resid	0.023537	Schwarz criterion		-6.619952
Log likelihood	1001.548	Durbin-Watson stat		2.124356
Inverted MA Roots	.14			

- **Model GARCH (1,1)**

Dependent Variable: RETURN
 Method: ML - ARCH (Marquardt)
 Date: 01/12/13 Time: 14:47
 Sample: 1 300
 Included observations: 300
 Convergence achieved after 23 iterations
 MA backcast: 0, Variance backcast: ON

	Coefficient	Std. Error	z-Statistic	Prob.
MA(1)	-0.245337	0.056488	-4.343148	0.0000
Variance Equation				
C	2.74E-08	4.04E-08	0.679052	0.4971
ARCH(1)	0.154820	0.016904	9.158744	0.0000
GARCH(1)	0.895608	0.007321	122.3294	0.0000
R-squared	0.019511	Mean dependent var		-0.001123
Adjusted R-squared	0.009573	S.D. dependent var		0.008970
S.E. of regression	0.008927	Akaike info criterion		-6.533917
Sum squared resid	0.023589	Schwarz criterion		-7.084533
Log likelihood	1074.087	Durbin-Watson stat		1.900781
Inverted MA Roots	.25			

Lampiran 7 (lanjutan)

c. Saham Lippo Cikarang

- **Model ARCH (1)**

Dependent Variable: RETURN
 Method: ML - ARCH (Marquardt)
 Date: 01/12/13 Time: 15:06
 Sample(adjusted): 2 300
 Included observations: 299 after adjusting endpoints
 Convergence achieved after 27 iterations
 Variance backcast: ON

	Coefficient	Std. Error	z-Statistic	Prob.
AR(1)	-0.117103	0.071379	-1.640583	0.1009
Variance Equation				
C	0.000211	7.30E-06	28.89743	0.0000
ARCH(1)	0.043321	0.039274	1.103055	0.2700
R-squared	0.014422	Mean dependent var		0.000820
Adjusted R-squared	0.007763	S.D. dependent var		0.014946
S.E. of regression	0.014888	Akaike info criterion		-5.568508
Sum squared resid	0.065606	Schwarz criterion		-5.531379
Log likelihood	835.4919	Durbin-Watson stat		2.019260
Inverted AR Roots	-.12			

- **Model GARCH (1,1)**

Dependent Variable: RETURN
 Method: ML - ARCH (Marquardt)
 Sample(adjusted): 2 300
 Included observations: 299 after adjusting endpoints
 Convergence achieved after 30 iterations
 Variance backcast: ON

	Coefficient	Std. Error	z-Statistic	Prob.
AR(1)	-0.130505	0.074417	-1.753695	0.0495
Variance Equation				
C	3.40E-05	1.29E-05	2.631543	0.0085
ARCH(1)	0.081825	0.035034	2.335577	0.0195
GARCH(1)	0.763870	0.088249	8.655840	0.0000
R-squared	0.014664	Mean dependent var		0.000820
Adjusted R-squared	0.004644	S.D. dependent var		0.014946
S.E. of regression	0.014911	Akaike info criterion		-5.618013
Sum squared resid	0.065590	Schwarz criterion		-5.568509
Log likelihood	843.8930	Durbin-Watson stat		1.991633
Inverted AR Roots	-.13			

Lampiran 8. Pola Data *Training* dan *Testing* Model ANN

a. Saham BCA

- *Data training*

<i>Input Training</i>					Target
P1	P2	P3	P4	P5	
0	0.002723	0	-0.00272	0.002723	0.005395
0.002723	0	-0.00272	0.002723	0.005395	-0.01086
0	-0.00272	0.002723	0.005395	-0.01086	0.00274
-0.00272	0.002723	0.005395	-0.01086	0.00274	-0.00827
...
...
-0.00271	-0.00546	0.008169	-0.00271	-0.00546	-0.00276
-0.00546	0.008169	-0.00271	-0.00546	-0.00276	0.00822
0.008169	-0.00271	-0.00546	-0.00276	0.00822	-0.00272
-0.00271	-0.00546	-0.00276	0.00822	-0.00272	-0.00274

- *Data testing*

<i>Input Testing</i>					Target
P1	P2	P3	P4	P5	
-0.00276	-0.00278	0.005532	0	-0.00276	0.002757
-0.00278	0.005532	0	-0.00276	0.002757	-0.00276
0.005532	0	-0.00276	0.002757	-0.00276	0.002757
0	-0.00276	0.002757	-0.00276	0.002757	-0.00276
-0.00276	0.002757	-0.00276	0.002757	-0.00276	0.002757
...
...
0	0	0	0	0.030949	0
0	0	0	0.030949	0	-0.01164
0	0	0.030949	0	-0.01164	0
0	0.030949	0	-0.01164	0	-0.00714
0.030949	0	-0.01164	0	-0.00714	0.007139

Lampiran 8 (lanjutan)

b. Saham Bayan Resources

- *Data training*

<i>Input Training</i>					Target
P1	P2	P3	P4	P5	
0	-0.00226	-0.00799	0.005722	0	0
-0.002256	-0.00799	0.005722	0	0	0
-0.00799	0.005722	0	0	0	-0.01035
0.005722	0	0	0	-0.01035	-0.00351
...
...
0.0036343	0.007179	0	0	0.02085	0.00338
0.0071786	0	0	0.02085	0.00338	0
0	0	0.02085	0.00338	0	0
0	0.02085	0.00338	0	0	-0.04613

- *Data testing*

<i>Input Testing</i>					Target
P1	P2	P3	P4	P5	
0.046132	0	0.003354	0.006631	0	0
0	0.003354	0.006631	0	0	-0.03779
0.003354	0.006631	0	0	-0.03779	0
0.006631	0	0	-0.03779	0	-0.02209
0	0	-0.03779	0	-0.02209	0
...
...
0.004477	0	0	0	-0.01128	0
0	0	0	-0.01128	0	-0.01158
0	0	-0.01128	0	-0.01158	0
0	-0.01128	0	-0.01158	0	-0.03418
-0.01128	0	-0.01158	0	-0.03418	0.010042

Lampiran 8 (lanjutan)

c. Saham Lippo Cikarang

- *Data training*

<i>Input Training</i>					Target
P1	P2	P3	P4	P5	
0	0.004799	0.02323	-0.00914	0.026872	0.005395
0.004799	0.02323	-0.00914	0.026872	0.005395	-0.01862
0.02323	-0.00914	0.026872	0.005395	-0.01862	-0.00224
-0.00914	0.026872	0.005395	-0.01862	-0.00224	-0.02788
...
...
0	0.006074	0.011899	0.00583	0	0
0.006074	0.011899	0.00583	0	0	-0.00877
0.011899	0.00583	0	0	-0.00877	-0.00296
0.00583	0	0	-0.00877	-0.00296	0.002964

- *Data testing*

<i>Input Training</i>					Target
P1	P2	P3	P4	P5	
0.002944	0	0.017259	-0.01143	0.002886	0
0	0.017259	-0.01143	0.002886	0	0.016923
0.017259	-0.01143	0.002886	0	0.016923	-0.00557
-0.01143	0.002886	0	0.016923	-0.00557	-0.00281
0.002886	0	0.016923	-0.00557	-0.00281	0
...
...
0.044419	0	0	0	-0.02803	0
0	0	0	-0.02803	0	0.003205
0	0	-0.02803	0	0.003205	0
0	-0.02803	0	0.003205	0	-0.0196
-0.02803	0	0.003205	0	-0.0196	-0.00673

Lampiran 9. Hasil *Training* dan *Testing* Model ANN

a. Saham BCA

Data Return				Data volatilitas			
Target	Training	Target	Testing	Target	Training	Target	Testing
-0.00254	0.90247	-0.00254	0.461156	-4.47219	1.13E-05	-0.85514	2.14E-05
0.002388	-1.81693	-0.00254	-0.46152	-3.86253	1.22E-05	-0.94485	2.13E-05
0.002429	0.458259	-0.00254	0.461156	-2.91149	1.48E-05	-1.02278	2.10E-05
-0.00254	-1.38436	-0.00254	-0.46152	-2.76464	1.57E-05	-1.09056	2.08E-05
0.008919	1.83966	0.002429	0.461156	-2.21059	1.71E-05	-1.14943	2.06E-05
-0.00441	-0.45584	-0.00254	0.458338	-1.54223	1.88E-05	-1.20057	2.05E-05
0.002429	2.249794	-0.00254	-0.00018	-1.57495	1.95E-05	-1.19819	2.04E-05
0.002388	0.880677	-0.00254	0.455372	-0.40574	2.12E-05	-1.27424	2.03E-05
-0.00179	-1.32546	0.002429	1.349767	-0.10374	2.22E-05	-1.28918	2.03E-05
-0.00179	-0.00018	-0.00183	-0.89732	0.00772	2.34E-05	-0.81256	2.02E-05
0.002429	0.885958	-0.00179	0.896962	-0.20754	2.44E-05	-0.84687	2.00E-05
-0.0053	-0.88632	-0.00254	-0.00018	-0.21255	2.28E-05	-0.84354	2.09E-05
-0.00254	-0.89735	-0.00179	0.444227	-0.29537	2.29E-05	-0.95883	2.14E-05
0.002429	-0.00018	0.002388	-0.44459	-0.18519	2.25E-05	-1.01767	2.13E-05
-0.00254	-1.82845	0.002429	-0.44741	-0.38668	2.24E-05	-1.0885	2.09E-05
...
...
-0.4587	0.002388	-1.63323	0.002388	0.088701	2.22E-05	1.41083	2.69E-05
-0.46152	-0.00179	5.561809	0.003948	-0.15754	2.25E-05	1.033003	2.56E-05
0.919675	0.002429	-5.69286	-0.00441	-0.29108	2.27E-05	1.2807	2.60E-05
0.908176	0.002429	0.413884	-0.00179	-0.31436	2.27E-05	7.902736	2.91E-05
-0.90854	-0.00183	-0.00018	-0.00285	-0.19118	2.27E-05	11.8511	2.91E-05
0.908176	0.002429	-0.00018	-0.00179	-0.27046	2.22E-05	10.23688	2.61E-05
-0.45299	-0.00254	-0.00018	0.002085	-0.33934	2.24E-05	8.663003	3.79E-05
-0.91425	-0.00179	-0.00018	0.002429	-0.51344	2.25E-05	7.293109	3.83E-05
1.366695	0.003948	-0.00018	-0.00254	-0.41649	2.22E-05	6.102636	3.83E-05
-0.45299	-0.00254	5.178377	-0.00254	-0.24356	2.19E-05	5.068021	3.63E-05
-0.91425	-0.00676	-0.00018	0.002388	-0.4408	2.20E-05	4.168894	3.45E-05
-0.46152	-0.00254	-1.94851	-0.00179	-0.35336	2.22E-05	10.33173	2.91E-05
1.375227	0.002429	-0.00018	-0.00179	-0.43012	2.23E-05	9.068439	4.16E-05
-0.45573	-0.00441	-1.19475	-0.00859	-0.18799	2.21E-05	8.628439	3.05E-05
-0.4587	-0.00254	1.194392	-0.00214	-0.39243	2.22E-05	7.309114	3.72E-05

Lampiran 9 (lanjutan)

b. Saham Bayan Resources

Data Return				Data volatilitas			
Target	Training	Target	Testing	Target	Training	Target	Testing
0.126046	-0.00024	0.126046	-0.00023	-0.18179	7.15E-08	0.110697	0.000223
0.126046	-0.00023	-5.22551	-0.00023	-0.3236	6.81E-06	-0.27344	9.96E-05
-1.34031	-0.01035	0.126046	-0.00591	-0.35979	9.68E-05	-0.35202	9.96E-05
-0.37065	-0.00023	-3.00195	-0.00023	-0.36539	1.59E-05	9.945424	1.63E-05
0.126046	-0.00023	0.126046	0.024932	0.407783	1.62E-05	1.8506	0.000305
-0.54249	-0.00023	0.126046	0.015177	0.017493	7.28E-05	3.499041	3.75E-05
-0.04221	-0.00591	-2.05132	-0.00605	-0.30163	9.53E-05	0.444036	3.75E-05
-0.04267	-0.00036	-0.43056	0.02658	-0.1955	9.15E-05	-0.24094	0.000216
0.965126	-0.00023	5.477602	-0.00036	-0.30021	9.85E-05	1.35966	0.000961
1.445203	-0.00023	-5.22551	-0.00242	-0.34029	1.62E-05	0.32913	0.000225
-0.0373	-0.00024	0.126046	0.020936	-0.13331	1.60E-05	9.531453	0.001003
-0.86333	-0.00023	-0.43564	-0.00036	0.506874	1.45E-05	7.037465	0.000305
-0.37466	-0.00036	-1.30103	-0.00023	-0.22196	1.34E-04	1.400394	3.75E-05
-0.04179	-0.00023	-0.45419	0.02605	0.037446	1.23E-04	0.020691	3.75E-05
...
...
0.126046	-0.00036	-1.75688	-0.00023	-0.09683	5.02E-05	-0.12634	0.000878
0.630181	-0.00023	0.126046	-0.00591	-0.23542	0.000112	-0.10964	1.63E-05
0.126046	-0.00023	0.126046	-0.00036	-0.34475	9.04E-05	0.657813	1.55E-05
0.126046	-0.00023	0.126046	-0.00023	-0.27157	9.91E-05	-0.13103	-7.78E-05
-1.65681	-0.00023	0.760115	-0.0059	-0.34623	1.62E-05	-0.32997	0.000115
0.640728	-0.00023	0.126046	-0.00036	-0.36329	1.60E-05	-0.36077	9.79E-05
1.142666	-0.00023	0.126046	-0.00023	0.778297	1.58E-05	-0.22081	9.95E-05
0.126046	-0.00023	0.126046	-0.00023	-0.18704	-7.76E-05	-0.33516	1.62E-05
0.126046	3.35E-08	-1.47155	-0.00023	0.131564	0.000108	-0.36158	1.58E-05
3.07881	-0.00036	0.126046	-0.00023	-0.26693	1.88E-05	-0.36567	1.55E-05
0.60468	-0.00023	-1.51416	-0.00023	-0.35101	9.85E-05	0.552493	1.57E-05
0.126046	-0.00024	0.126046	-0.00591	2.774591	9.96E-05	-0.16885	0.000155
0.126046	-0.00036	-4.71385	-0.00023	0.640893	0.000125	0.632622	0.000116
-6.40705	-0.04613	1.54817	-0.00591	-0.2055	4.20E-05	-0.15345	-0.00036

Lampiran 9 (lanjutan)

c. Saham Lippo Cikarang

Data Return				Data volatilitas			
Target	Training	Target	Testing	Target	Training	Target	Testing
0.269840719	0.005142	-0.07066	-0.01036	-2.33317	0.000202	-0.69647	0.000351
-1.246060985	-0.00468	0.997403	0.009409	-2.12826	0.000218	-0.72343	0.000347
-0.212318524	-0.00107	-0.42208	-0.00932	-1.87847	0.000258	-0.62579	0.000355
-1.830211973	0.001714	-0.24808	-0.00468	-1.76247	0.000252	-0.65948	0.000356
1.830540559	0.025576	-0.07066	-0.01036	-1.33404	0.000271	-0.68308	0.000357
-1.224948472	-0.01829	-0.07066	0.005142	-1.06371	0.000301	-0.71144	0.000349
0.222496928	-0.00468	-0.97537	-0.0202	-1.00194	0.000323	-0.73704	0.000396
-0.660153145	-0.01036	-0.44108	0.009891	-0.99721	0.000324	-0.67244	0.000353
0.664239182	0.007374	0.115169	0.001714	-0.96434	0.000309	-0.6646	0.000352
-0.216075975	-0.01036	-0.2565	0.017215	-0.92627	0.000322	-0.69413	0.000352
-0.363823553	-0.00468	0.846152	0.009891	-0.92932	0.000329	-0.71943	0.000348
-0.218427679	-0.00561	-0.43372	0.005142	-0.92062	0.000331	-0.66303	0.000345
...
...
-0.448741347	-0.00599	0.139378	0.007395	-0.48664	0.000358	-0.62827	0.000358
-0.647741894	-0.00468	0.13778	0.005142	-0.53351	0.000369	-0.66222	0.000355
0.315402539	0.005142	-0.48915	-0.0047	-0.5297	0.000364	-0.68573	0.00036
-0.263016528	0.001714	2.732823	-0.00468	-0.56789	0.000364	-0.69959	0.000349
-0.070663313	-0.00468	-0.07066	0.005142	-0.60746	0.000366	0.053665	0.000349
0.312702696	0.005142	-0.07066	-0.00468	-0.64368	0.000355	-0.00122	0.000419
0.68034862	0.005142	-0.07066	0.00423	-0.66064	0.000361	-0.10097	0.000418
0.297264669	0.005142	-1.83968	0.005142	-0.61518	0.000352	-0.1903	0.000408
-0.070663313	1.12E-06	-0.07066	0.011006	-0.61823	0.000356	0.064363	0.00047
-0.070663313	2.42E-08	0.131627	0.001714	-0.65269	0.000356	-0.02208	0.00042
-0.624423976	0.005142	-0.07066	0.007374	-0.68443	0.000351	-0.11527	0.000412
-0.257764529	-0.00561	-1.30742	0.009891	-0.68006	0.000349	-0.20285	0.000404
0.116437904	0.001714	-0.49564	0.009891	-0.69779	0.00035	-0.11797	0.000398

Lampiran 10. Pola Data *Training* dan *Testing* Model Neuro-GARCH

a. Saham BCA

- *Data return*

<i>Input Training</i>		Target	<i>Input Testing</i>		Target
P1	P2		P1	P2	
0	0	0	-0.00274	-0.00168	-0.00276
0	0.001362	0.002723	-0.00276	-0.00169	-0.00278
0.002723	0.000295	0	-0.00278	0.002466	0.005532
0	-0.00136	-0.00272	0.005532	0.000599	0
...
...
-0.00271	-0.00302	-0.00546	0.030949	0.003348	0
-0.00546	-0.00197	-0.00276	0	-0.00582	-0.01164
-0.00276	0.003812	0.00822	-0.01164	-0.00126	0
0.00822	-0.00047	-0.00272	0	-0.00357	-0.00714
-0.00272	-0.00166	-0.00274	-0.00714	0.002797	0.007139

- *Data volatilitas*

<i>Input Training</i>		Target	<i>Input Testing</i>		Target
P1	P2		P1	P2	
0	0	2.39E-06	2.22E-05	2.77E-06	2.19E-05
2.39E-06	0	4.47E-06	2.19E-05	2.81E-06	2.17E-05
4.47E-06	1.85E-06	6.42E-06	2.17E-05	2.84E-06	2.15E-05
6.42E-06	8.68E-08	7.98E-06	2.15E-05	6.08E-06	2.15E-05
...
...
2.21E-05	9.15E-06	2.23E-05	5.24E-05	1.12E-05	4.89E-05
2.23E-05	3.88E-06	2.21E-05	4.89E-05	3.39E-05	4.76E-05
2.21E-05	1.45E-05	2.28E-05	4.76E-05	1.59E-06	4.39E-05
2.28E-05	2.23E-07	2.22E-05	4.39E-05	1.27E-05	4.16E-05

Lampiran 10 (lanjutan)

b. Saham Bayan Resources

- *Data return*

<i>Input Training</i>		<i>Target</i>	<i>Input Testing</i>		<i>Target</i>
P1	P2		P1	P2	
0	0	0	-0.02307	0.017407	0.046132
0	-0.00113	-0.00226	0.017407	0.005659	0
-0.00113	-0.00427	-0.00799	0.005659	0.001677	0.003354
-0.00427	0.001881	0.005722	0.001677	0.003727	0.006631
...
...
0	0.010425	0.02085	-0.00564	-0.00138	0
0.010425	0.004248	0.00338	-0.00138	-0.00579	-0.01158
0.004248	0.000415	0	-0.00579	-0.00142	0
0.000415	0	0	-0.00142	-0.01709	-0.03418
0	-0.02307	-0.04613	-0.01709	0.000829	0.010042

- *Data volatilitas*

<i>Input Training</i>		<i>Target</i>	<i>Input Testing</i>		<i>Target</i>
P1	P2		P1	P2	
0	0	2.74E-08	2.18E-05	0.000532	0.000102
2.74E-08	0	5.19E-08	0.000102	0.000303	0.000138
5.19E-08	1.27E-06	2.71E-07	0.000138	3.2E-05	0.000129
2.71E-07	1.82E-05	3.1E-06	0.000129	2.81E-06	0.000116
...
...
1.14E-05	0.000109	2.71E-05	3.35E-05	1.91E-06	3.03E-05
2.71E-05	1.8E-05	2.71E-05	3.03E-05	3.35E-05	3.24E-05
2.71E-05	1.72E-07	2.43E-05	3.24E-05	2.02E-06	2.93E-05
2.43E-05	0	2.18E-05	2.93E-05	0.000292	7.15E-05

Lampiran 10 (lanjutan)

c. Saham Lippo Cikarang

- *Data return*

<i>Input Training</i>		<i>Target</i>	<i>Input Testing</i>		<i>Target</i>
<i>P1</i>	<i>P2</i>		<i>P1</i>	<i>P2</i>	
0	0	0	0.002964	0.001836	0.002944
0	0.002399	0.004799	0.002944	0.000361	0
0.004799	0.012204	0.02323	0	0.00863	0.017259
0.02323	-0.00172	-0.00914	0.017259	-0.0036	-0.01143
...
...
0	0	0	0	0.001603	0.003205
0	-0.00439	-0.00877	0.003205	0.000393	0
-0.00877	-0.00256	-0.00296	0	-0.0098	-0.0196
-0.00296	0.001119	0.002964	-0.0196	-0.00577	-0.00673

- *Data volatilitas*

<i>Input Training</i>		<i>Target</i>	<i>Input Testing</i>		<i>Target</i>
<i>P1</i>	<i>P2</i>		<i>P1</i>	<i>P2</i>	
0	0	0.000034	0.000349	1.25E-06	0.000347
0.000034	0	6.45E-05	0.000347	3.37E-06	0.000345
6.45E-05	5.76E-06	9.26E-05	0.000345	1.3E-07	0.000343
9.26E-05	0.000149	0.00014	0.000343	7.45E-05	0.000353
...
...
0.000356	5.11E-07	0.000353	0.000418	1.18E-05	0.000411
0.000353	0	0.00035	0.000411	2.57E-06	0.000402
0.00035	1.92E-05	0.000351	0.000402	1.55E-07	0.000394
0.000351	6.55E-06	0.000349	0.000394	9.6E-05	0.000402

Lampiran 11. Hasil *Training* dan *Testing* Model Neuro-GARCH

a. Saham BCA

Data Return				Data volatilitas			
Target	Training	Target	Testing	Target	Training	Target	Testing
-0.00209	-2.34E-05	-0.46769	-0.00280	-5.51388	2.44E-06	-0.27924	2.19E-05
0.457785	0.002768	-0.47076	-0.00281	-4.95724	4.35E-06	-0.34658	2.17E-05
-0.00209	-1.51E-05	9.32E-01	0.00558	-4.43289	6.40E-06	-0.40431	2.15E-05
-0.46196	-0.00277	-0.00209	0.00000	-4.0159	7.97E-06	-0.38357	2.15E-05
0.457785	0.002748	-0.46769	-0.00280	-3.6148	9.51E-06	-0.49085	2.11E-05
0.908911	0.005491	0.463517	0.00278	-3.28191	1.07E-05	-0.55031	2.09E-05
-1.83564	-0.01079	-0.46769	-0.00280	-2.82149	1.24E-05	-0.61806	2.07E-05
0.460592	0.002717	0.463517	0.00278	-2.10327	1.50E-05	-0.67692	2.04E-05
-1.39907	-0.00821	-0.46769	-0.00280	-1.99237	1.54E-05	-0.7281	2.02E-05
1.854768	0.010981	0.463517	0.00278	-1.57395	1.69E-05	-0.77256	2.01E-05
-0.46196	-0.00277	0.460672	0.00281	-1.06921	1.89E-05	-0.81118	1.99E-05
2.268695	0.013522	-0.00209	-0.00002	-1.09392	1.89E-05	-0.80939	1.99E-05
0.886917	0.005456	0.457678	0.00277	-0.21092	2.21E-05	-0.86682	1.97E-05
...
...
0.926276	0.005547	-5.74741	-0.02507	-0.12434	2.25E-05	6.063622	3.15E-05
0.914671	0.005549	0.415807	0.00250	-0.14192	2.24E-05	9.045418	3.71E-05
-0.91884	-0.00544	-0.00209	-0.00002	-0.0489	2.28E-05	7.826361	4.25E-05
0.914671	0.005457	-0.00209	-0.00002	-0.10877	2.26E-05	6.637775	4.23E-05
-0.45908	-0.00275	-0.00209	-0.00002	-0.16078	2.24E-05	5.603233	4.19E-05
-0.92461	-0.00546	-0.00209	-0.00002	-0.29226	2.19E-05	4.704189	4.10E-05
1.37743	0.008138	-0.00209	-0.00002	-0.21905	2.22E-05	3.922849	3.93E-05
-0.45908	-0.00275	5.224362	0.02517	-0.08845	2.27E-05	3.243829	3.68E-05
-0.92461	-0.00546	-0.00209	0.00019	-0.2374	2.21E-05	7.897996	3.29E-05
-0.46769	-0.00279	-1.96843	-0.01162	-0.17137	2.23E-05	6.94396	4.24E-05
1.386041	0.008188	-0.00209	-0.00003	-0.22934	2.21E-05	6.611672	4.21E-05
-0.46185	-0.00277	-1.20771	-0.00710	-0.04648	2.28E-05	5.615319	4.19E-05
-0.46485	-0.00278	1.203534	0.00713	-0.20088	2.22E-05	4.993731	4.12E-05

Lampiran 11 (lanjutan)

b. Saham Bayan Resources

Data Return				Data volatilitas			
Target	Training	Target	Testing	Target	Training	Target	Testing
0.12690	2.9E-05	6.701813	0.04194	-0.91859	1.45E-07	5.26388	1.01E-04
-0.19465	-0.0022	0.126897	0.00221	-0.9171	1.69E-07	7.466114	1.22E-04
-1.01186	-0.00796	0.604874	0.00061	-0.90381	3.82E-07	6.893077	1.16E-04
0.94242	0.00524	1.071919	0.00663	-0.73247	3.15E-06	6.105508	1.08E-04
0.12690	0.00055	0.126897	-0.00014	-0.71718	3.36E-06	5.504198	1.01E-04
0.12690	-0.00029	0.126897	-0.00034	-0.73209	3.11E-06	4.841423	9.19E-05
0.12690	2.9E-05	-5.25891	-0.03859	-0.75007	2.82E-06	4.241611	8.35E-05
-1.34885	-0.01041	0.126897	-0.00121	-0.76617	2.57E-06	7.057677	1.19E-04
-0.37298	-0.00362	-3.02112	-0.02009	-0.52883	6.44E-06	6.428338	1.11E-04
0.12690	0.00045	0.126897	-0.00118	-0.48214	7.15E-06	6.808502	1.15E-04
-0.54592	-0.00445	0.126897	0.00115	-0.52448	6.45E-06	6.072321	1.07E-04
-0.04244	-0.00123	-2.0644	-0.01550	-0.5118	6.67E-06	5.344027	9.85E-05
-0.04290	-0.0009	-0.43327	-0.00424	-0.53985	6.20E-06	5.246832	9.70E-05
...
...
0.63426	0.003589	0.126897	-0.00078	-0.1925	1.19E-05	3.134579	6.68E-05
0.12690	6.9E-05	0.126897	0.00072	-0.23705	1.11E-05	2.737937	6.05E-05
0.12690	-0.00017	0.126897	0.00003	-0.30492	1.00E-05	2.357712	5.43E-05
-1.66737	-0.01269	0.765024	0.00439	-0.36749	9.00E-06	2.017184	4.87E-05
0.64487	0.002867	0.126897	0.00007	-0.05136	1.42E-05	1.759278	4.44E-05
1.15002	0.007798	0.126897	-0.00022	-0.1397	1.27E-05	1.484051	3.98E-05
0.12690	-0.00016	0.126897	0.00003	-0.06659	1.40E-05	1.234723	3.56E-05
0.12690	-0.00037	-1.48093	-0.01136	-0.14676	1.26E-05	1.011424	3.19E-05
3.09856	0.02091	0.126897	-0.00039	-0.22584	1.13E-05	1.110281	3.36E-05
0.60859	0.003354	-1.52381	-0.01094	0.724189	2.70E-05	0.91796	3.03E-05
0.12690	-0.00123	0.126897	-0.00041	0.72365	2.71E-05	1.042724	3.25E-05
0.12690	-0.00016	-4.74398	-0.03402	0.555318	2.43E-05	0.858424	2.93E-05
-6.44802	-0.04613	1.558122	0.00840	0.402943	2.17E-05	3.417124	7.21E-05

Lampiran 11 (lanjutan)

c. Saham Lippo Cikarang

Data Return				Data volatilitas			
Target	Training	Target	Testing	Target	Training	Target	Testing
-0.0812	0.00004	0.1046	0.00294	-3.69427	3.89E-05	-0.58713	3.47E-04
0.2217	0.00477	-0.0812	0.00003	-3.39195	6.60E-05	-0.60398	3.45E-04
1.3848	0.02327	1.0080	0.01720	-3.11234	9.22E-05	-0.62406	3.43E-04
-0.6582	-0.00934	-0.8025	-0.01160	-2.64184	1.33E-04	-0.52777	3.53E-04
1.6147	0.02699	0.1009	0.00290	-2.44483	1.59E-04	-0.53611	3.52E-04
0.2593	0.00540	-0.0812	0.00003	-2.03984	1.97E-04	-0.56348	3.49E-04
-1.2565	-0.01872	0.9868	0.01686	-1.85501	2.19E-04	-0.58779	3.47E-04
-0.2228	-0.00209	-0.4326	-0.00563	-1.62968	2.42E-04	-0.49972	3.56E-04
-1.8406	-0.02782	-0.2586	-0.00270	-1.52505	2.53E-04	-0.53011	3.53E-04
1.8199	0.03036	-0.0812	0.00005	-1.13859	2.91E-04	-0.55139	3.51E-04
-1.2354	-0.01866	-0.0812	0.00004	-0.89474	3.17E-04	-0.57698	3.48E-04
0.2120	0.00462	-0.9858	-0.01430	-0.83903	3.22E-04	-0.60007	3.46E-04
-0.6706	-0.00931	-0.4516	-0.00566	-0.83476	3.23E-04	-0.54180	3.52E-04
...
...
-0.4592	-0.00604	0.1288	0.00333	-0.37420	3.69E-04	-0.50196	3.56E-04
-0.6582	-0.00899	0.1273	0.00329	-0.41648	3.64E-04	-0.53258	3.53E-04
0.3049	0.00606	-0.4996	-0.00657	-0.41304	3.65E-04	-0.55379	3.50E-04
-0.2735	-0.00301	2.7221	0.04415	-0.44749	3.61E-04	-0.56629	3.49E-04
-0.0812	0.00005	-0.0812	-0.00001	-0.48319	3.57E-04	0.11318	4.16E-04
0.3022	0.00603	-0.0812	0.00004	-0.51586	3.54E-04	0.06366	4.12E-04
0.6698	0.01183	-0.0812	0.00004	-0.53116	3.53E-04	-0.02631	4.03E-04
0.2867	0.00580	-1.8500	-0.02793	-0.49015	3.57E-04	-0.10689	3.95E-04
-0.0812	0.00002	-0.0812	0.00010	-0.49290	3.57E-04	0.12283	4.18E-04
-0.0812	0.00004	0.1211	0.00320	-0.52398	3.53E-04	0.04485	4.10E-04
-0.6349	-0.00868	-0.0812	0.00003	-0.55261	3.51E-04	-0.03921	4.01E-04
-0.2683	-0.00283	-1.3178	-0.01964	-0.54867	3.51E-04	-0.11821	3.94E-04
0.1059	0.00297	-0.5061	-0.00649	-0.56467	3.49E-04	-0.04165	4.02E-04

Lampiran 12. Bobot Model Neuro-GARCH Terbaik Data *Return*

a. Saham BCA

- **Bobot lapisan *input* menuju lapisan tersembunyi**

-1.021463	0.004246
-0.994292	-0.220416
0.924738	0.408580
-0.494272	0.841765
0.869469	0.504843

- **Bobot bias *input* menuju lapisan tersembunyi**

2.860985033
1.278608813
0.288616389
1.786966769
3.414920514

- **Bobot lapisan tersembunyi menuju lapisan *output***

0.047184
-0.402369
0.407938
-0.236778
0.135370

- **Bobot bias lapisan tersembunyi menuju lapisan *output***

0.775721911

Lampiran 12 (lanjutan)

b. Saham Bayan Resources

- **Bobot lapisan *input* menuju lapisan tersembunyi**

0.6577999	-0.1167981
0.6687914	-0.0336650
0.5912108	0.2915295
0.5103786	-0.4017157
-0.6334584	0.2015068

- **Bobot bias *input* menuju lapisan tersembunyi**

-2.88333594
-1.20212664
0.74328761
1.34812703
-3.25149018

- **Bobot lapisan tersembunyi menuju lapisan *output***

-0.895390
0.113661
0.424050
-0.024179
0.235201

- **Bobot bias lapisan tersembunyi menuju lapisan *output***

-0.57244485

c. Saham Lippo Cikarang

- **Bobot lapisan *input* menuju lapisan tersembunyi**

0.52160575	0.79617991
0.87769165	-0.40307498
-0.80695520	-0.52461132
0.84445459	-0.46543054
0.86289366	-0.43224911
0.84108994	0.47115964
-0.97030025	0.02339145
-0.84382357	-0.46651211
-0.71991115	0.63321669
0.00861167	0.94406086

- **Bobot bias *input* menuju lapisan tersembunyi (a)**
- **Bobot lapisan tersembunyi menuju lapisan *output* (b)**

(a)	(b)
-6.27282153	0.25653471
-4.19224392	-0.73593766
4.35862545	0.23660356
-2.09128283	-0.23395979
-1.17951736	0.98238750
-1.38520838	-0.42634543
-0.07689019	0.41238286
-0.58468570	0.07041180
-3.23831731	-0.61357792
3.13786517	0.37887020

- **Bobot bias lapisan tersembunyi menuju lapisan *output***
-0.899089994

Lampiran 13. Bobot Model Neuro-GARCH Terbaik Data Volatilitas

a. Saham BCA

- Bobot lapisan *input* menuju lapisan tersembunyi

1.11920	-0.40783
-0.25320	1.25508
-0.16235	1.27278
-0.05427	1.28364
-1.05459	-0.57691
0.94807	-0.76531
-1.13416	-0.35548
-0.51806	-1.15459
0.28667	1.24652
-0.25259	1.25523

- Bobot bias *input* menuju lapisan tersembunyi (a)
- Bobot lapisan tersembunyi menuju lapisan *output* (b)

(a)	(b)
-1.0901789	-0.59282
-0.6118877	0.039834
-5.7558285	-0.89235
-2.2732049	0.724375
0.0756138	-0.11413
4.5102731	0.096018
-2.6754355	0.133722
-0.1914370	0.36079
0.4637376	-0.25724
-8.4816749	-0.84354

- Bobot bias lapisan tersembunyi menuju lapisan *output*
-0.087298553

b. Saham Bayan Resources

- **Bobot lapisan *input* menuju lapisan tersembunyi**

1.04243	-0.33004
-0.84862	-0.47607
0.08229	0.67511
-1.19037	-0.05325
1.04480	-0.32762

- **Bobot bias *input* menuju lapisan tersembunyi**

-3.48989429
5.06503208
-3.04784747
0.69749205
2.75661028

- **Bobot lapisan tersembunyi menuju lapisan *output***

-0.83075
0.16436
-0.69386
-0.85381
0.16113

- **Bobot bias lapisan tersembunyi menuju lapisan *output***

-0.425970495

c. Saham Lippo Cikarang

- **Bobot lapisan *input* menuju lapisan tersembunyi**

0.64635	-0.39198
-0.57879	-0.42753
-0.65004	-0.38982
-0.21738	-0.53300
0.61226	0.41079

- **Bobot bias *input* menuju lapisan tersembunyi**

-0.68666515
3.58427864
2.43403800
1.20572377
1.21880737

- **Bobot lapisan tersembunyi menuju lapisan *output***

-0.96726
-0.77066
-0.97518
-0.56755
-0.97714

- **Bobot bias lapisan tersembunyi menuju lapisan *output***

0.284898531

Lampiran 14. Hasil Ramalan Model Neuro-GARCH Terbaik untuk Data *Return* dan Volatilitas

a. Saham BCA

<i>Return</i>			Volatilitas		
Aktual	Ramalan	Error	Aktual	Ramalan	Error
-0.467691	-0.00279557	-0.4649	-0.27924	2.19E-05	-0.27926
-0.470760	-0.00281355	-0.4679	-0.34658	2.17E-05	-0.34661
0.932189	0.00558124	0.9266	-0.40431	2.15E-05	-0.40433
-0.002087	-0.00000416	-0.0021	-0.38357	2.15E-05	-0.38359
-0.467691	-0.00280061	-0.4649	-0.49085	2.11E-05	-0.49087
0.463517	0.00278258	0.4607	-0.55031	2.09E-05	-0.55034
-0.467691	-0.00280390	-0.4649	-0.61806	2.07E-05	-0.61808
0.463517	0.00278258	0.4607	-0.67692	2.04E-05	-0.67694
-0.467691	-0.00280390	-0.4649	-0.72810	2.02E-05	-0.72812
0.463517	0.00278258	0.4607	-0.77256	2.01E-05	-0.77258
0.460672	0.00280822	0.4579	-0.81118	1.99E-05	-0.81112
-0.002087	-0.00001503	-0.0021	-0.80939	1.99E-05	-0.80941
...
...
0.415807	0.00249976	0.4133	9.04542	3.71E-05	9.045381
-0.002087	-0.00001594	-0.0021	7.82636	4.25E-05	7.826318
-0.002087	-0.00002343	-0.0021	6.63778	4.23E-05	6.637733
-0.002087	-0.00002343	-0.0021	5.60323	4.19E-05	5.603191
-0.002087	-0.00002343	-0.0021	4.70419	4.10E-05	4.704148
-0.002087	-0.00002343	-0.0021	3.92285	3.93E-05	3.922809
5.224362	0.02516646	5.1992	3.24383	3.68E-05	3.243792
-0.002087	0.00019212	-0.0023	7.89800	3.29E-05	7.897963
-1.968432	-0.01161942	-1.9568	6.94396	4.24E-05	6.943917
-0.002087	-0.00003344	-0.0021	6.61167	4.21E-05	6.61163
-1.207707	-0.00710002	-1.2006	5.61532	4.19E-05	5.615277
1.203534	0.00713196	1.1964	4.99373	4.12E-05	4.99369

Lampiran 14 (lanjutan.)

b. Saham Bayan Resources

Return			Volatilitas		
Aktual	Ramalan	Error	Aktual	Ramalan	Error
6.70181	0.04194	6.65987	5.26388	0.000101	5.263779
0.12690	0.00221	0.12468	7.46611	0.000122	7.465992
0.60487	0.00061	0.60426	6.89308	0.000116	6.892961
1.07192	0.00663	1.06528	6.10551	0.000108	6.1054
0.12690	-0.00014	0.12704	5.50420	0.000101	5.504097
0.12690	-0.00034	0.12724	4.84142	0.000092	4.841331
-5.25891	-0.03859	-5.22032	4.24161	0.000083	4.241528
0.12690	-0.00121	0.12810	7.05768	0.000119	7.057559
-3.02112	-0.02009	-3.00103	6.42834	0.000111	6.428226
0.12690	-0.00118	0.12807	6.80850	0.000115	6.808387
0.12690	0.00115	0.12575	6.07232	0.000107	6.072213
-2.06440	-0.01550	-2.04891	5.34403	0.000098	5.343928
...
...
0.12690	0.00072	0.12617	2.73794	0.000060	2.737876
0.12690	0.00003	0.12687	2.35771	0.000054	2.357658
0.76502	0.00439	0.76063	2.01718	0.000049	2.017136
0.12690	0.00007	0.12682	1.75928	0.000044	1.759234
0.12690	-0.00022	0.12712	1.48405	0.000040	1.484011
0.12690	0.00003	0.12687	1.23472	0.000036	1.234688
-1.48093	-0.01136	-1.46957	1.01142	0.000032	1.011392
0.12690	-0.00039	0.12729	1.11028	0.000034	1.110248
-1.52381	-0.01094	-1.51287	0.91796	0.000030	0.91793
0.12690	-0.00041	0.12731	1.04272	0.000032	1.042692
-4.74398	-0.03402	-4.70996	0.85842	0.000029	0.858395
1.55812	0.00840	1.54972	3.41712	0.000072	3.417052

Lampiran 14 (lanjutan)

c. Saham Lippo Cikarang

Return			Volatilitas		
Aktual	Ramalan	<i>Error</i>	Aktual	Ramalan	<i>Error</i>
0.10464	0.002939	0.10170	-0.58713	0.000347	-0.58747
-0.08117	0.000032	-0.08121	-0.60398	0.000345	-0.60433
1.00802	0.017200	0.99082	-0.62406	0.000343	-0.6244
-0.80248	-0.011597	-0.79088	-0.52777	0.000353	-0.52813
0.10094	0.002898	0.09804	-0.53611	0.000352	-0.53647
-0.08117	0.000032	-0.08121	-0.56348	0.000349	-0.56383
0.98680	0.016860	0.96994	-0.58779	0.000347	-0.58814
-0.43256	-0.005628	-0.42693	-0.49972	0.000356	-0.50007
-0.25857	-0.002700	-0.25587	-0.53011	0.000353	-0.53046
-0.08117	0.000053	-0.08123	-0.55139	0.000351	-0.55174
-0.08117	0.000043	-0.08122	-0.57698	0.000348	-0.57733
-0.98581	-0.014304	-0.97150	-0.60007	0.000346	-0.60042
...
...
0.12725	0.003293	0.12396	-0.5326	0.00035	-0.53293
-0.49962	-0.006565	-0.49306	-0.5538	0.00035	-0.55414
2.72207	0.044154	2.67792	-0.5663	0.00035	-0.56664
-0.08117	-0.000013	-0.08116	0.1132	0.00042	0.11276
-0.08117	0.000043	-0.08122	0.0637	0.00041	0.063252
-0.08117	0.000043	-0.08122	-0.0263	0.00040	-0.02671
-1.85004	-0.027926	-1.82211	-0.1069	0.00039	-0.10729
-0.08117	0.000098	-0.08127	0.1228	0.00042	0.122408
0.12110	0.003200	0.11790	0.0448	0.00041	0.044439
-0.08117	0.000031	-0.08120	-0.0392	0.00040	-0.03961
-1.31783	-0.019639	-1.29819	-0.1182	0.00039	-0.11861
-0.50611	-0.006495	-0.49962	-0.0416	0.00040	-0.04205

Lampiran 15. Source Code ANN

```
function[ptrn,ttrn,ptes,ttes,TRnorm,TRdenorm,TESnorm,TESdenorm,BOinput,BObiasinput,BOoutput,BObiasoutput,MSEtrain,MSEtest,MADtrain,MADtest]=jeste(Ptrain,Ttrain,Ptest,Ttest,hid)
```

```
[ptrn,meanptrn,stdptrn,ttrn,meanttrn,stdttrn]=prestd(Ptrain,Ttrain);  
ptes=trastd(Ptest,meanptrn,stdptrn);  
ttes=trastd(Ttest,meanttrn,stdttrn);
```

```
net=newff(minmax(ptrn),[hid 1],{'tansig' 'purelin'},'trainbfg');
```

```
BOinput=net.Iw{1,1};  
BObiasinput=net.b{1,1};  
BOoutput=net.LW{2,1};  
BObiasoutput=net.b{2,1};
```

```
net.trainparam.epochs = 10000;  
net.trainparam.goal = 0.0001;  
net.trainparam.lr = 0.05;
```

```
net=train(net,ptrn,ttrn);
```

```
TRnorm=sim(net,ptrn);  
TRdenorm=poststd(TRnorm,meanttrn,stdttrn);
```

```
TESnorm=sim(net,ptes);  
TESdenorm=poststd(TESnorm,meanttrn,stdttrn);
```

```
MSEtrain=mse(Ttrain-TRdenorm);  
MSEtest=mse(Ttest-TESdenorm);  
MADtrain=mad(Ttrain-TRdenorm);  
MADtest=mad(Ttest-TESdenorm);
```

```
b=[1:size(Ttest,2)];  
plot(b,Ttest,'blue',b,TESdenorm,'red');  
title('Plot Aktual dan Ramalan');
```

Lampiran 16. Value at Risk

$$\text{VaR} = -S \times [\hat{Z}_t - Z_\alpha \hat{\sigma}_t]$$

Di mana : $S = 1$ Milyar dan $Z_\alpha = 1.645$

Saham BCA			Saham Bayan Resources			Saham Lippo Cikarang		
		VaR			VaR			VaR
0	2.39E-06	2543108.29	0	2.74E-08	272295.95	0	0.000034	9591915.87
0.001362	4.47E-06	2115174.63	-0.001128	5.19E-08	1502954.44	0.002399	6.45E-05	10806811.99
-0.00029	6.42E-06	4463830.00	-0.003718	2.71E-07	4574409.57	0.011026	9.26E-05	4804591.24
-0.00136	7.98E-06	6008423.23	0.003841	3.10E-06	-947062.86	-0.007421	0.00014	26885350.81
0.001656	9.48E-06	3407689.21	-0.000702	3.35E-06	3711443.60	0.014558	0.00016	6240138.73
0.002403	1.07E-05	2982865.53	0.000000	3.10E-06	2896956.44	-0.000599	0.000201	23899730.03
...
...
0.015475	3.51E-05	-5733087.11	-0.005641	3.18E-05	14922519.82	-0.014014	0.000395	46721714.35
-0.00335	5.24E-05	15259913.04	0.001384	3.35E-05	8132733.68	0.003438	0.000418	30212648.02
-0.00582	4.89E-05	17322332.09	-0.005791	3.03E-05	14845606.27	0.001603	0.000411	31731018.77
0.00126	4.76E-05	10093870.51	0.001421	3.24E-05	7936178.74	-0.000393	0.000402	33381289.52
-0.00357	4.39E-05	14471097.16	-0.017088	2.93E-05	25994651.02	-0.009798	0.000394	42457915.99
-0.0028	4.16E-05	13406997.30	0.009213	7.15E-05	4695532.97	-0.000963	0.000402	33941010.34
		13211829.45			12721393.40			35403715.01

Lampiran 17. *Capital Gain*

Saham BCA		Saham Bayan Resources		Saham Lippo Cikarang	
Close	Capital Gain	Close	Capital Gain	Close	Capital Gain
7815.47	0	19012.19	0	1800	0
7864.63	0.00629009	18913.68	-0.00518141	1820	0.01111111
7864.63	0	18568.9	-0.01822913	1920	0.05494505
7815.47	-0.00625077	18815.17	0.013262498	1880	-0.0208333
7864.63	0.00629009	18815.17	0	2000	0.06382979
7962.93	0.012499	18815.17	0	2025	0.0125
7766.32	-0.02469066	18815.17	0	1940	-0.0419753
7815.47	0.00632861	18371.89	-0.02355971	1930	-0.0051546
7668.01	-0.01886771	18224.12	-0.00804327	1810	-0.0621762
7864.63	0.02564159	18224.12	0	1940	0.0718232
7815.47	-0.00625077	18027.1	-0.01081095	1860	-0.0412371
8061.24	0.03144661	17977.85	-0.002732	1880	0.01075269
...
...
8800	0.00571429	9650	0	3300	0.00763359
8800	0	9650	0	3250	-0.0151515
8800	0	9750	0.010362694	3600	0.10769231
8800	0	9750	0	3600	0
8800	0	9750	0	3600	0
8800	0	9750	0	3600	0
9450	0.07386364	9500	-0.02564103	3375	-0.0625
9450	0	9500	0	3375	0
9200	-0.02645503	9250	-0.02631579	3400	0.00740741
9200	0	9250	0	3400	0
9050	-0.01630435	8550	-0.07567568	3250	-0.0441176
9200	0.01657459	8750	0.013391813	3200	-0.0153846