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DAFTAR LAMPIRAN

Lampiran 1 Data 6 aset investasi periode 1 Januari 2013 - 1 Oktober 2023

t	Date	NG	HG	MSFT	MAPI	EUR/JPY	EUR/CNY
1	1/1/2013	3.339	3.7395	27.45	640	124.27	8.4455
2	1/2/2013	3.486	3.5475	27.8	780	120.97	8.1288
3	1/3/2013	4.024	3.4125	28.6	910	120.73	7.9607
4	1/4/2013	4.343	3.1875	33.1	825	128.25	8.1164
5	1/5/2013	3.984	3.3	34.9	890	130.55	7.9718
6	1/6/2013	3.565	3.0575	34.54	700	128.94	7.9835
7	1/7/2013	3.446	3.125	31.84	580	130.15	8.1508
8	1/8/2013	3.581	3.2305	33.4	475	129.77	8.0909
9	1/9/2013	3.56	3.323	33.28	620	132.82	8.2767
10	1/10/2013	3.581	3.3045	35.4	540	133.58	8.2773
11	1/11/2013	3.954	3.2155	38.13	488	139.16	8.2787
12	1/12/2013	4.23	3.3965	37.41	550	144.73	8.3208
13	1/1/2014	4.943	3.2	37.84	545	137.59	8.1719
14	1/2/2014	4.609	3.1875	38.31	690	140.5	8.4811
15	1/3/2014	4.371	3.0245	40.99	625	142.09	8.56
16	1/4/2014	4.815	3.0275	40.4	638	141.77	8.6789
17	1/5/2014	4.542	3.1205	40.94	518	138.73	8.5148
18	1/6/2014	4.461	3.2035	41.7	478	138.69	8.4933
19	1/7/2014	3.841	3.236	43.16	520	137.62	8.2653
20	1/8/2014	4.065	3.153	45.43	603	136.64	8.067
21	1/9/2014	4.121	3.0075	46.36	550	138.49	7.7529
22	1/10/2014	3.873	3.047	46.95	530	140.64	7.6552
23	1/11/2014	4.088	2.856	47.81	560	147.67	7.6479
24	1/12/2014	2.889	2.8255	46.45	508	144.78	7.5057
25	1/1/2015	2.691	2.4955	40.4	588	132.54	7.0532
26	1/2/2015	2.734	2.6915	43.85	548	133.77	7.0175
27	1/3/2015	2.64	2.741	40.65	525	128.89	6.6515
28	1/4/2015	2.751	2.8865	48.64	558	133.92	6.9597
29	1/5/2015	2.642	2.733	46.86	580	136.36	6.8097
30	1/6/2015	2.832	2.615	44.15	553	136.39	6.9037
31	1/7/2015	2.716	2.369	46.7	465	136.15	6.8226
32	1/8/2015	2.689	2.3385	43.52	400	135.89	7.1481
33	1/9/2015	2.524	2.341	44.26	300	133.93	7.103
34	1/10/2015	2.321	2.3235	52.64	345	132.73	6.953
	1/11/2015	2.235	2.046	54.35	410	130.01	6.7583
	1/12/2015	2.337	2.135	55.48	380	130.65	7.0504
	1/1/2016	2.298	2.0705	55.09	375	131.12	7.1236
	1/2/2016	1.711	2.1325	50.88	425	122.47	7.1232



39	1/3/2016	1.959	2.188	55.23	480	128.07	7.3365
40	1/4/2016	2.178	2.2835	49.87	420	121.81	7.4151
41	1/5/2016	2.288	2.1	53	378	123.18	7.3227
42	1/6/2016	2.924	2.1955	51.17	415	114.65	7.3796
43	1/7/2016	2.876	2.225	56.68	475	114.03	7.4156
44	1/8/2016	2.887	2.075	57.46	460	115.38	7.4495
45	1/9/2016	2.906	2.2105	57.6	460	113.87	7.4941
46	1/10/2016	3.026	2.208	59.92	550	115.07	7.4366
47	1/11/2016	3.352	2.6295	60.26	528	121.15	7.2871
48	1/12/2016	3.724	2.5055	62.14	540	122.87	7.2992
49	1/1/2017	3.117	2.7335	64.65	553	121.77	7.4242
50	1/2/2017	2.774	2.714	63.98	538	119.23	7.2613
51	1/3/2017	3.19	2.66	65.86	598	118.63	7.3313
52	1/4/2017	3.276	2.6075	68.46	633	121.51	7.5067
53	1/5/2017	3.071	2.5865	69.84	628	124.51	7.6549
54	1/6/2017	3.035	2.711	68.93	680	128.34	7.744
55	1/7/2017	2.794	2.9	72.7	630	130.52	7.9612
56	1/8/2017	3.04	3.094	74.77	700	130.94	7.8459
57	1/9/2017	3.007	2.955	74.49	700	132.85	7.8589
58	1/10/2017	2.896	3.108	83.18	655	132.3	7.7232
59	1/11/2017	3.025	3.0555	84.17	693	133.92	7.866
60	1/12/2017	2.953	3.3005	85.54	620	135.16	7.805
61	1/1/2018	2.995	3.2065	95.01	730	135.61	7.8049
62	1/2/2018	2.667	3.1325	93.77	760	130.05	7.7151
63	1/3/2018	2.733	3.037	91.27	778	130.92	7.7285
64	1/4/2018	2.763	3.074	93.52	825	132.04	7.6478
65	1/5/2018	2.952	3.075	98.84	843	127.2	7.4928
66	1/6/2018	2.924	2.966	98.61	900	129.28	7.7308
67	1/7/2018	2.782	2.8405	106.08	885	130.78	7.9543
68	1/8/2018	2.916	2.6645	112.33	835	128.82	7.9235
69	1/9/2018	3.008	2.805	114.37	825	131.96	7.9724
70	1/10/2018	3.261	2.667	106.81	800	127.72	7.8873
71	1/11/2018	4.612	2.7865	110.89	875	128.38	7.8705
72	1/12/2018	2.94	2.631	101.57	805	125.65	7.8855
73	1/1/2019	2.814	2.789	104.43	1,005	124.61	7.664
74	1/2/2019	2.812	2.948	112.03	1,060	126.63	7.6079
75	1/3/2019	2.662	2.9395	117.94	970	124.33	7.528
76	1/4/2019	2.575	2.904	130.6	995	124.96	7.5523
77	1/5/2019	2.454	2.6405	123.68	880	121.05	7.7179
	1/6/2019	2.308	2.7135	133.96	900	122.64	7.8041
	1/7/2019	2.233	2.6715	136.27	945	120.42	7.6226
	1/8/2019	2.285	2.547	137.86	990	116.8	7.8619
	1/9/2019	2.33	2.5785	139.03	1,030	117.79	7.7896



82	1/10/2019	2.633	2.6425	143.37	1,000	120.44	7.8473
83	1/11/2019	2.281	2.656	151.38	1,015	120.63	7.7444
84	1/12/2019	2.189	2.797	157.7	1,055	121.75	7.8042
85	1/1/2020	1.841	2.52	170.23	960	120.23	7.6945
86	1/2/2020	1.684	2.54	162.01	800	119.15	7.7071
87	1/3/2020	1.64	2.232	157.71	472	118.59	7.8094
88	1/4/2020	1.949	2.344	179.21	655	117.4	7.7342
89	1/5/2020	1.849	2.4345	183.25	725	119.64	7.9182
90	1/6/2020	1.751	2.7285	203.51	780	121.2	7.9348
91	1/7/2020	1.799	2.877	205.01	685	124.66	8.2138
92	1/8/2020	2.63	3.0555	225.53	680	126.39	8.1731
93	1/9/2020	2.527	3.0325	210.33	570	123.52	7.9561
94	1/10/2020	3.354	3.0515	202.47	655	121.87	7.7941
95	1/11/2020	2.882	3.4335	214.07	805	124.37	7.8439
96	1/12/2020	2.539	3.519	222.42	790	126.09	7.969
97	1/1/2021	2.564	3.558	231.96	770	127.04	7.7974
98	1/2/2021	2.771	4.0925	232.38	805	128.68	7.8155
99	1/3/2021	2.608	4	235.77	740	129.83	7.684
100	1/4/2021	2.931	4.468	252.18	800	131.32	7.7793
101	1/5/2021	2.986	4.681	249.68	700	133.95	7.7859
102	1/6/2021	3.65	4.289	270.9	625	131.71	7.6543
103	1/7/2021	3.914	4.4655	284.91	620	130.21	7.6691
104	1/8/2021	4.377	4.37	301.88	740	129.9	7.6278
105	1/9/2021	5.867	4.089	281.92	780	128.86	7.4642
106	1/10/2021	5.426	4.359	331.62	880	131.8	7.4048
107	1/11/2021	4.567	4.2805	330.59	740	128.24	7.2142
108	1/12/2021	3.73	4.4635	336.32	710	130.82	7.2211
109	1/1/2022	4.874	4.3265	310.98	780	129.29	7.1447
110	1/2/2022	4.402	4.4545	298.79	785	129.01	7.0774
111	1/3/2022	5.642	4.752	308.31	880	134.65	7.0144
112	1/4/2022	7.244	4.4085	277.52	900	136.85	6.9655
113	1/5/2022	8.145	4.299	271.87	900	138.11	7.1605
114	1/6/2022	5.424	3.71	256.83	980	142.27	7.0209
115	1/7/2022	8.229	3.575	280.74	890	136.09	6.8903
116	1/8/2022	9.127	3.519	261.47	1,010	139.75	6.9283
117	1/9/2022	6.766	3.4125	232.9	1,060	141.84	6.9705
118	1/10/2022	6.355	3.375	232.13	1,205	146.97	7.2161
119	1/11/2022	6.93	3.738	255.14	1,450	143.62	7.375
120	1/12/2022	4.475	3.8105	239.82	1,445	140.31	7.3814
	1/1/2023	2.684	4.226	247.81	1,300	141.3	7.3362
	1/2/2023	2.747	4.074	249.42	1,510	144.05	7.3318
	1/3/2023	2.216	4.0945	288.3	1,510	143.93	7.4438
	1/4/2023	2.41	3.8812	307.26	1,370	150.18	7.6159



125	1/5/2023	2.266	3.637	328.39	1,775	148.93	7.6001
126	1/6/2023	2.798	3.7595	340.54	1,690	157.45	7.9112
127	1/7/2023	2.634	4.008	335.92	1,980	156.45	7.854
128	1/8/2023	2.768	3.822	327.76	1,935	157.77	7.8686
129	1/9/2023	2.929	3.7375	315.75	1,820	157.86	7.7172
130	1/10/2023	3.366	3.6627	329.82	1,960	160.41	7.7372



Lampiran 2 Hasil *return* aset investasi NG, HG, MSFT, MAPI, EUR/JPY, dan EUR/CNY periode 1 Januari 2013 hingga 1 Oktober 2023

<i>t</i>	<i>Date</i>	<i>Return Investasi</i>					
		NG	HG	MSFT	MAPI	EUR/JPY	EUR/CNY
1	1/1/2013						
2	1/2/2013	0.04403	-0.05134	0.01275	0.21875	-0.02656	-0.03750
3	1/3/2013	0.15433	-0.03805	0.02878	0.16667	-0.00198	-0.02068
4	1/4/2013	0.07927	-0.06593	0.15734	-0.09341	0.06229	0.01956
5	1/5/2013	-0.08266	0.03529	0.05438	0.07879	0.01793	-0.01782
6	1/6/2013	-0.10517	-0.07348	-0.01032	-0.21348	-0.01233	0.00147
7	1/7/2013	-0.03338	0.02208	-0.07817	-0.17143	0.00938	0.02096
8	1/8/2013	0.03918	0.03376	0.04899	-0.18103	-0.00292	-0.00735
9	1/9/2013	-0.00586	0.02863	-0.00359	0.30526	0.02350	0.02296
10	1/10/2013	0.00590	-0.00557	0.06370	-0.12903	0.00572	0.00007
11	1/11/2013	0.10416	-0.02693	0.07712	-0.09630	0.04177	0.00017
12	1/12/2013	0.06980	0.05629	-0.01888	0.12705	0.04003	0.00509
13	1/1/2014	0.16856	-0.05785	0.01149	-0.00909	-0.04933	-0.01789
14	1/2/2014	-0.06757	-0.00391	0.01242	0.26606	0.02115	0.03784
15	1/3/2014	-0.05164	-0.05114	0.06996	-0.09420	0.01132	0.00930
16	1/4/2014	0.10158	0.00099	-0.01439	0.02080	-0.00225	0.01389
17	1/5/2014	-0.05670	0.03072	0.01337	-0.18809	-0.02144	-0.01891
18	1/6/2014	-0.01783	0.02660	0.01856	-0.07722	-0.00029	-0.00253
19	1/7/2014	-0.13898	0.01015	0.03501	0.08787	-0.00772	-0.02684
20	1/8/2014	0.05832	-0.02565	0.05259	0.15962	-0.00712	-0.02399
21	1/9/2014	0.01378	-0.04615	0.02047	-0.08789	0.01354	-0.03894
22	1/10/2014	-0.06018	0.01313	0.01273	-0.03636	0.01552	-0.01260
23	1/11/2014	0.05551	-0.06268	0.01832	0.05660	0.04999	-0.00095
24	1/12/2014	-0.29330	-0.01068	-0.02845	-0.09286	-0.01957	-0.01859
25	1/1/2015	-0.06854	-0.11679	-0.13025	0.15748	-0.08454	-0.06029
26	1/2/2015	0.01598	0.07854	0.08540	-0.06803	0.00928	-0.00506
27	1/3/2015	-0.03438	0.01839	-0.07298	-0.04197	-0.03648	-0.05216
28	1/4/2015	0.04205	0.05308	0.19656	0.06286	0.03903	0.04634
29	1/5/2015	-0.03962	-0.05318	-0.03660	0.03943	0.01822	-0.02155
30	1/6/2015	0.07192	-0.04318	-0.05783	-0.04655	0.00022	0.01380
31	1/7/2015	-0.04096	-0.09407	0.05776	-0.15913	-0.00176	-0.01175
32	1/8/2015	-0.00994	-0.01287	-0.06809	-0.13978	-0.00191	0.04771
33	1/9/2015	-0.06136	0.00107	0.01700	-0.25000	-0.01442	-0.00631
	1/10/2015	-0.08043	-0.00748	0.18934	0.15000	-0.00896	-0.02112
	1/11/2015	-0.03705	-0.11943	0.03248	0.18841	-0.02049	-0.02800
	1/12/2015	0.04564	0.04350	0.02079	-0.07317	0.00492	0.04322
	1/1/2016	-0.01669	-0.03021	-0.00703	-0.01316	0.00360	0.01038
	1/2/2016	-0.25544	0.02994	-0.07642	0.13333	-0.06597	-0.00006





39	1/3/2016	0.14494	0.02603	0.08550	0.12941	0.04573	0.02994
40	1/4/2016	0.11179	0.04365	-0.09705	-0.12500	-0.04888	0.01071
41	1/5/2016	0.05051	-0.08036	0.06276	-0.10000	0.01125	-0.01246
42	1/6/2016	0.27797	0.04548	-0.03453	0.09788	-0.06925	0.00777
43	1/7/2016	-0.01642	0.01344	0.10768	0.14458	-0.00541	0.00488
44	1/8/2016	0.00382	-0.06742	0.01376	-0.03158	0.01184	0.00457
45	1/9/2016	0.00658	0.06530	0.00244	0.00000	-0.01309	0.00599
46	1/10/2016	0.04129	-0.00113	0.04028	0.19565	0.01054	-0.00767
47	1/11/2016	0.10773	0.19090	0.00567	-0.04000	0.05284	-0.02010
48	1/12/2016	0.11098	-0.04716	0.03120	0.02273	0.01420	0.00166
49	1/1/2017	-0.16300	0.09100	0.04039	0.02407	-0.00895	0.01713
50	1/2/2017	-0.11004	-0.00713	-0.01036	-0.02712	-0.02086	-0.02194
51	1/3/2017	0.14996	-0.01990	0.02938	0.11152	-0.00503	0.00964
52	1/4/2017	0.02696	-0.01974	0.03948	0.05853	0.02428	0.02392
53	1/5/2017	-0.06258	-0.00805	0.02016	-0.00790	0.02469	0.01974
54	1/6/2017	-0.01172	0.04813	-0.01303	0.08280	0.03076	0.01164
55	1/7/2017	-0.07941	0.06972	0.05469	-0.07353	0.01699	0.02805
56	1/8/2017	0.08805	0.06690	0.02847	0.11111	0.00322	-0.01448
57	1/9/2017	-0.01086	-0.04493	-0.00374	0.00000	0.01459	0.00166
58	1/10/2017	-0.03691	0.05178	0.11666	-0.06429	-0.00414	-0.01727
59	1/11/2017	0.04454	-0.01689	0.01190	0.05802	0.01224	0.01849
60	1/12/2017	-0.02380	0.08018	0.01628	-0.10534	0.00926	-0.00775
61	1/1/2018	0.01422	-0.02848	0.11071	0.17742	0.00333	-0.00001
62	1/2/2018	-0.10952	-0.02308	-0.01305	0.04110	-0.04100	-0.01151
63	1/3/2018	0.02475	-0.03049	-0.02666	0.02368	0.00669	0.00174
64	1/4/2018	0.01098	0.01218	0.02465	0.06041	0.00855	-0.01044
65	1/5/2018	0.06840	0.00033	0.05689	0.02182	-0.03666	-0.02027
66	1/6/2018	-0.00949	-0.03545	-0.00233	0.06762	0.01635	0.03176
67	1/7/2018	-0.04856	-0.04231	0.07575	-0.01667	0.01160	0.02891
68	1/8/2018	0.04817	-0.06196	0.05892	-0.05650	-0.01499	-0.00387
69	1/9/2018	0.03155	0.05273	0.01816	-0.01198	0.02438	0.00617
70	1/10/2018	0.08411	-0.04920	-0.06610	-0.03030	-0.03213	-0.01067
71	1/11/2018	0.41429	0.04481	0.03820	0.09375	0.00517	-0.00213
72	1/12/2018	-0.36253	-0.05580	-0.08405	-0.08000	-0.02126	0.00191
73	1/1/2019	-0.04286	0.06005	0.02816	0.24845	-0.00828	-0.02809
74	1/2/2019	-0.00071	0.05701	0.07278	0.05473	0.01621	-0.00732
75	1/3/2019	-0.05334	-0.00288	0.05275	-0.08491	-0.01816	-0.01050
76	1/4/2019	-0.03268	-0.01208	0.10734	0.02577	0.00507	0.00323
77	1/5/2019	-0.04699	-0.09074	-0.05299	-0.11558	-0.03129	0.02193
	/2019	-0.05949	0.02765	0.08312	0.02273	0.01314	0.01117
	/2019	-0.03250	-0.01548	0.01724	0.05000	-0.01810	-0.02326
	/2019	0.02329	-0.04660	0.01167	0.04762	-0.03006	0.03139
	/2019	0.01969	0.01237	0.00849	0.04040	0.00848	-0.00920



82	1/10/2019	0.13004	0.02482	0.03122	-0.02913	0.02250	0.00741
83	1/11/2019	-0.13369	0.00511	0.05587	0.01500	0.00158	-0.01311
84	1/12/2019	-0.04033	0.05309	0.04175	0.03941	0.00928	0.00772
85	1/1/2020	-0.15898	-0.09903	0.07945	-0.09005	-0.01248	-0.01406
86	1/2/2020	-0.08528	0.00794	-0.04829	-0.16667	-0.00898	0.00164
87	1/3/2020	-0.02613	-0.12126	-0.02654	-0.41000	-0.00470	0.01327
88	1/4/2020	0.18841	0.05018	0.13633	0.38771	-0.01003	-0.00963
89	1/5/2020	-0.05131	0.03861	0.02254	0.10687	0.01908	0.02379
90	1/6/2020	-0.05300	0.12076	0.11056	0.07586	0.01304	0.00210
91	1/7/2020	0.02741	0.05443	0.00737	-0.12179	0.02855	0.03516
92	1/8/2020	0.46192	0.06204	0.10009	-0.00730	0.01388	-0.00496
93	1/9/2020	-0.03916	-0.00753	-0.06740	-0.16176	-0.02271	-0.02655
94	1/10/2020	0.32727	0.00627	-0.03737	0.14912	-0.01336	-0.02036
95	1/11/2020	-0.14073	0.12518	0.05729	0.22901	0.02051	0.00639
96	1/12/2020	-0.11901	0.02490	0.03901	-0.01863	0.01383	0.01595
97	1/1/2021	0.00985	0.01108	0.04289	-0.02532	0.00753	-0.02153
98	1/2/2021	0.08073	0.15022	0.00181	0.04545	0.01291	0.00232
99	1/3/2021	-0.05882	-0.02260	0.01459	-0.08075	0.00894	-0.01683
100	1/4/2021	0.12385	0.11700	0.06960	0.08108	0.01148	0.01240
101	1/5/2021	0.01876	0.04767	-0.00991	-0.12500	0.02003	0.00085
102	1/6/2021	0.22237	-0.08374	0.08499	-0.10714	-0.01672	-0.01690
103	1/7/2021	0.07233	0.04115	0.05172	-0.00800	-0.01139	0.00193
104	1/8/2021	0.11829	-0.02139	0.05956	0.19355	-0.00238	-0.00539
105	1/9/2021	0.34042	-0.06430	-0.06612	0.05405	-0.00801	-0.02145
106	1/10/2021	-0.07517	0.06603	0.17629	0.12821	0.02282	-0.00796
107	1/11/2021	-0.15831	-0.01801	-0.00311	-0.15909	-0.02701	-0.02574
108	1/12/2021	-0.18327	0.04275	0.01733	-0.04054	0.02012	0.00096
109	1/1/2022	0.30670	-0.03069	-0.07534	0.09859	-0.01170	-0.01058
110	1/2/2022	-0.09684	0.02959	-0.03920	0.00641	-0.00217	-0.00942
111	1/3/2022	0.28169	0.06679	0.03186	0.12102	0.04372	-0.00890
112	1/4/2022	0.28394	-0.07229	-0.09987	0.02273	0.01634	-0.00697
113	1/5/2022	0.12438	-0.02484	-0.02036	0.00000	0.00921	0.02800
114	1/6/2022	-0.33407	-0.13701	-0.05532	0.08889	0.03012	-0.01950
115	1/7/2022	0.51715	-0.03639	0.09310	-0.09184	-0.04344	-0.01860
116	1/8/2022	0.10913	-0.01566	-0.06864	0.13483	0.02689	0.00551
117	1/9/2022	-0.25868	-0.03026	-0.10927	0.04950	0.01496	0.00609
118	1/10/2022	-0.06074	-0.01099	-0.00331	0.13679	0.03617	0.03523
119	1/11/2022	0.09048	0.10756	0.09913	0.20332	-0.02279	0.02202
120	1/12/2022	-0.35426	0.01940	-0.06005	-0.00345	-0.02305	0.00087
	1/1/2023	-0.40022	0.10904	0.03332	-0.10035	0.00706	-0.00612
	1/2/2023	0.02347	-0.03597	0.00650	0.16154	0.01946	-0.00060
	1/3/2023	-0.19330	0.00503	0.15588	0.00000	-0.00083	0.01528
	1/4/2023	0.08755	-0.05209	0.06576	-0.09272	0.04342	0.02312



125	1/5/2023	-0.05975	-0.06292	0.06877	0.29562	-0.00832	-0.00207
126	1/6/2023	0.23477	0.03368	0.03700	-0.04789	0.05721	0.04093
127	1/7/2023	-0.05861	0.06610	-0.01357	0.17160	-0.00635	-0.00723
128	1/8/2023	0.05087	-0.04641	-0.02429	-0.02273	0.00844	0.00186
129	1/9/2023	0.05816	-0.02211	-0.03664	-0.05943	0.00057	-0.01924
130	1/10/2023	0.14920	-0.02001	0.04456	0.07692	0.01615	0.00259



Lampiran 3 Bobot optimal dari masing-masing aset investasi

	NG	HG	MSFT	MAPI	EUR/JPY	EUR/CNY
Bobot Optimal	0.13738	0.100086	0.06878	0.129651	0.069567	0.494535

Lampiran 4 Hasil *return* portofolio periode 1 Januari 2013 hingga 1 Oktober 2023

<i>t</i>	<i>Date</i>	NG	HG	MSFT	MAPI	EUR/JPY	EUR/CNY	<i>Return</i> Portofolio
1	1/1/2013							
2	1/2/2013	0.04403	-0.05134	0.01275	0.21875	-0.02656	-0.03750	0.00976
3	1/3/2013	0.15433	-0.03805	0.02878	0.16667	-0.00198	-0.02068	0.03062
4	1/4/2013	0.07927	-0.06593	0.15734	-0.09341	0.06229	0.01956	0.01701
5	1/5/2013	-0.08266	0.03529	0.05438	0.07879	0.01793	-0.01782	-0.00143
6	1/6/2013	-0.10517	-0.07348	-0.01032	-0.21348	-0.01233	0.00147	-0.05032
7	1/7/2013	-0.03338	0.02208	-0.07817	-0.17143	0.00938	0.02096	-0.01896
8	1/8/2013	0.03918	0.03376	0.04899	-0.18103	-0.00292	-0.00735	-0.01518
9	1/9/2013	-0.00586	0.02863	-0.00359	0.30526	0.02350	0.02296	0.05438
10	1/10/2013	0.00590	-0.00557	0.06370	-0.12903	0.00572	0.00007	-0.01166
11	1/11/2013	0.10416	-0.02693	0.07712	-0.09630	0.04177	0.00017	0.00742
12	1/12/2013	0.06980	0.05629	-0.01888	0.12705	0.04003	0.00509	0.03570
13	1/1/2014	0.16856	-0.05785	0.01149	-0.00909	-0.04933	-0.01789	0.00470
14	1/2/2014	-0.06757	-0.00391	0.01242	0.26606	0.02115	0.03784	0.04586
15	1/3/2014	-0.05164	-0.05114	0.06996	-0.09420	0.01132	0.00930	-0.01423
16	1/4/2014	0.10158	0.00099	-0.01439	0.02080	-0.00225	0.01389	0.02247
17	1/5/2014	-0.05670	0.03072	0.01337	-0.18809	-0.02144	-0.01891	-0.03902
18	1/6/2014	-0.01783	0.02660	0.01856	-0.07722	-0.00029	-0.00253	-0.00979
19	1/7/2014	-0.13898	0.01015	0.03501	0.08787	-0.00772	-0.02684	-0.01809
20	1/8/2014	0.05832	-0.02565	0.05259	0.15962	-0.00712	-0.02399	0.01740
21	1/9/2014	0.01378	-0.04615	0.02047	-0.08789	0.01354	-0.03894	-0.03103
22	1/10/2014	-0.06018	0.01313	0.01273	-0.03636	0.01552	-0.01260	-0.01594
23	1/11/2014	0.05551	-0.06268	0.01832	0.05660	0.04999	-0.00095	0.01296
24	1/12/2014	-0.29330	-0.01068	-0.02845	-0.09286	-0.01957	-0.01859	-0.06591
25	1/1/2015	-0.06854	-0.11679	-0.13025	0.15748	-0.08454	-0.06029	-0.04534
26	1/2/2015	0.01598	0.07854	0.08540	-0.06803	0.00928	-0.00506	0.00525
27	1/3/2015	-0.03438	0.01839	-0.07298	-0.04197	-0.03648	-0.05216	-0.04167
28	1/4/2015	0.04205	0.05308	0.19656	0.06286	0.03903	0.04634	0.05839
29	1/5/2015	-0.03962	-0.05318	-0.03660	0.03943	0.01822	-0.02155	-0.01756
30	1/6/2015	0.07192	-0.04318	-0.05783	-0.04655	0.00022	0.01380	0.00239
		-0.04096	-0.09407	0.05776	-0.15913	-0.00176	-0.01175	-0.03763
		-0.00994	-0.01287	-0.06809	-0.13978	-0.00191	0.04771	-0.00200
		-0.06136	0.00107	0.01700	-0.25000	-0.01442	-0.00631	-0.04369
		-0.08043	-0.00748	0.18934	0.15000	-0.00896	-0.02112	0.00961



35	1/11/2015	-0.03705	-0.11943	0.03248	0.18841	-0.02049	-0.02800	-0.00566
36	1/12/2015	0.04564	0.04350	0.02079	-0.07317	0.00492	0.04322	0.02428
37	1/1/2016	-0.01669	-0.03021	-0.00703	-0.01316	0.00360	0.01038	-0.00212
38	1/2/2016	-0.25544	0.02994	-0.07642	0.13333	-0.06597	-0.00006	-0.02468
39	1/3/2016	0.14494	0.02603	0.08550	0.12941	0.04573	0.02994	0.06317
40	1/4/2016	0.11179	0.04365	-0.09705	-0.12500	-0.04888	0.01071	-0.00126
41	1/5/2016	0.05051	-0.08036	0.06276	-0.10000	0.01125	-0.01246	-0.01513
42	1/6/2016	0.27797	0.04548	-0.03453	0.09788	-0.06925	0.00777	0.05208
43	1/7/2016	-0.01642	0.01344	0.10768	0.14458	-0.00541	0.00488	0.02728
44	1/8/2016	0.00382	-0.06742	0.01376	-0.03158	0.01184	0.00457	-0.00629
45	1/9/2016	0.00658	0.06530	0.00244	0.00000	-0.01309	0.00599	0.00966
46	1/10/2016	0.04129	-0.00113	0.04028	0.19565	0.01054	-0.00767	0.03064
47	1/11/2016	0.10773	0.19090	0.00567	-0.04000	0.05284	-0.02010	0.02284
48	1/12/2016	0.11098	-0.04716	0.03120	0.02273	0.01420	0.00166	0.01743
49	1/1/2017	-0.16300	0.09100	0.04039	0.02407	-0.00895	0.01713	0.00046
50	1/2/2017	-0.11004	-0.00713	-0.01036	-0.02712	-0.02086	-0.02194	-0.03236
51	1/3/2017	0.14996	-0.01990	0.02938	0.11152	-0.00503	0.00964	0.03951
52	1/4/2017	0.02696	-0.01974	0.03948	0.05853	0.02428	0.02392	0.02555
53	1/5/2017	-0.06258	-0.00805	0.02016	-0.00790	0.02469	0.01974	0.00244
54	1/6/2017	-0.01172	0.04813	-0.01303	0.08280	0.03076	0.01164	0.02094
55	1/7/2017	-0.07941	0.06972	0.05469	-0.07353	0.01699	0.02805	0.00535
56	1/8/2017	0.08805	0.06690	0.02847	0.11111	0.00322	-0.01448	0.02822
57	1/9/2017	-0.01086	-0.04493	-0.00374	0.00000	0.01459	0.00166	-0.00441
58	1/10/2017	-0.03691	0.05178	0.11666	-0.06429	-0.00414	-0.01727	-0.00903
59	1/11/2017	0.04454	-0.01689	0.01190	0.05802	0.01224	0.01849	0.02276
60	1/12/2017	-0.02380	0.08018	0.01628	-0.10534	0.00926	-0.00775	-0.01097
61	1/1/2018	0.01422	-0.02848	0.11071	0.17742	0.00333	-0.00001	0.02995
62	1/2/2018	-0.10952	-0.02308	-0.01305	0.04110	-0.04100	-0.01151	-0.02147
63	1/3/2018	0.02475	-0.03049	-0.02666	0.02368	0.00669	0.00174	0.00291
64	1/4/2018	0.01098	0.01218	0.02465	0.06041	0.00855	-0.01044	0.00769
65	1/5/2018	0.06840	0.00033	0.05689	0.02182	-0.03666	-0.02027	0.00360
66	1/6/2018	-0.00949	-0.03545	-0.00233	0.06762	0.01635	0.03176	0.02060
67	1/7/2018	-0.04856	-0.04231	0.07575	-0.01667	0.01160	0.02891	0.00725
68	1/8/2018	0.04817	-0.06196	0.05892	-0.05650	-0.01499	-0.00387	-0.00581
69	1/9/2018	0.03155	0.05273	0.01816	-0.01198	0.02438	0.00617	0.01406
70	1/10/2018	0.08411	-0.04920	-0.06610	-0.03030	-0.03213	-0.01067	-0.00936
71	1/11/2018	0.41429	0.04481	0.03820	0.09375	0.00517	-0.00213	0.07549
72	1/12/2018	-0.36253	-0.05580	-0.08405	-0.08000	-0.02126	0.00191	-0.07208
73	1/1/2019	-0.04286	0.06005	0.02816	0.24845	-0.00828	-0.02809	0.01980
		-0.00071	0.05701	0.07278	0.05473	0.01621	-0.00732	0.01522
		-0.05334	-0.00288	0.05275	-0.08491	-0.01816	-0.01050	-0.02145
		-0.03268	-0.01208	0.10734	0.02577	0.00507	0.00323	0.00697
		-0.04699	-0.09074	-0.05299	-0.11558	-0.03129	0.02193	-0.02550



78	1/6/2019	-0.05949	0.02765	0.08312	0.02273	0.01314	0.01117	0.00969
79	1/7/2019	-0.03250	-0.01548	0.01724	0.05000	-0.01810	-0.02326	-0.01111
80	1/8/2019	0.02329	-0.04660	0.01167	0.04762	-0.03006	0.03139	0.01895
81	1/9/2019	0.01969	0.01237	0.00849	0.04040	0.00848	-0.00920	0.00581
82	1/10/2019	0.13004	0.02482	0.03122	-0.02913	0.02250	0.00741	0.02395
83	1/11/2019	-0.13369	0.00511	0.05587	0.01500	0.00158	-0.01311	-0.01844
84	1/12/2019	-0.04033	0.05309	0.04175	0.03941	0.00928	0.00772	0.01222
85	1/1/2020	-0.15898	-0.09903	0.07945	-0.09005	-0.01248	-0.01406	-0.04578
86	1/2/2020	-0.08528	0.00794	-0.04829	-0.16667	-0.00898	0.00164	-0.03567
87	1/3/2020	-0.02613	-0.12126	-0.02654	-0.41000	-0.00470	0.01327	-0.06447
88	1/4/2020	0.18841	0.05018	0.13633	0.38771	-0.01003	-0.00963	0.08509
89	1/5/2020	-0.05131	0.03861	0.02254	0.10687	0.01908	0.02379	0.02531
90	1/6/2020	-0.05300	0.12076	0.11056	0.07586	0.01304	0.00210	0.02419
91	1/7/2020	0.02741	0.05443	0.00737	-0.12179	0.02855	0.03516	0.01330
92	1/8/2020	0.46192	0.06204	0.10009	-0.00730	0.01388	-0.00496	0.07412
93	1/9/2020	-0.03916	-0.00753	-0.06740	-0.16176	-0.02271	-0.02655	-0.04645
94	1/10/2020	0.32727	0.00627	-0.03737	0.14912	-0.01336	-0.02036	0.05135
95	1/11/2020	-0.14073	0.12518	0.05729	0.22901	0.02051	0.00639	0.03141
96	1/12/2020	-0.11901	0.02490	0.03901	-0.01863	0.01383	0.01595	-0.00474
97	1/1/2021	0.00985	0.01108	0.04289	-0.02532	0.00753	-0.02153	-0.00800
98	1/2/2021	0.08073	0.15022	0.00181	0.04545	0.01291	0.00232	0.03419
99	1/3/2021	-0.05882	-0.02260	0.01459	-0.08075	0.00894	-0.01683	-0.02751
100	1/4/2021	0.12385	0.11700	0.06960	0.08108	0.01148	0.01240	0.05096
101	1/5/2021	0.01876	0.04767	-0.00991	-0.12500	0.02003	0.00085	-0.00773
102	1/6/2021	0.22237	-0.08374	0.08499	-0.10714	-0.01672	-0.01690	0.00460
103	1/7/2021	0.07233	0.04115	0.05172	-0.00800	-0.01139	0.00193	0.01674
104	1/8/2021	0.11829	-0.02139	0.05956	0.19355	-0.00238	-0.00539	0.04047
105	1/9/2021	0.34042	-0.06430	-0.06612	0.05405	-0.00801	-0.02145	0.03163
106	1/10/2021	-0.07517	0.06603	0.17629	0.12821	0.02282	-0.00796	0.02268
107	1/11/2021	-0.15831	-0.01801	-0.00311	-0.15909	-0.02701	-0.02574	-0.05900
108	1/12/2021	-0.18327	0.04275	0.01733	-0.04054	0.02012	0.00096	-0.02309
109	1/1/2022	0.30670	-0.03069	-0.07534	0.09859	-0.01170	-0.01058	0.04062
110	1/2/2022	-0.09684	0.02959	-0.03920	0.00641	-0.00217	-0.00942	-0.01702
111	1/3/2022	0.28169	0.06679	0.03186	0.12102	0.04372	-0.00890	0.06190
112	1/4/2022	0.28394	-0.07229	-0.09987	0.02273	0.01634	-0.00697	0.02554
113	1/5/2022	0.12438	-0.02484	-0.02036	0.00000	0.00921	0.02800	0.02769
114	1/6/2022	-0.33407	-0.13701	-0.05532	0.08889	0.03012	-0.01950	-0.05943
115	1/7/2022	0.51715	-0.03639	0.09310	-0.09184	-0.04344	-0.01860	0.04968
116	1/8/2022	0.10913	-0.01566	-0.06864	0.13483	0.02689	0.00551	0.03078
		-0.25868	-0.03026	-0.10927	0.04950	0.01496	0.00609	-0.03561
		-0.06074	-0.01099	-0.00331	0.13679	0.03617	0.03523	0.02800
		0.09048	0.10756	0.09913	0.20332	-0.02279	0.02202	0.06568
		-0.35426	0.01940	-0.06005	-0.00345	-0.02305	0.00087	-0.05248



121	1/1/2023	-0.40022	0.10904	0.03332	-0.10035	0.00706	-0.00612	-0.05733
122	1/2/2023	0.02347	-0.03597	0.00650	0.16154	0.01946	-0.00060	0.02207
123	1/3/2023	-0.19330	0.00503	0.15588	0.00000	-0.00083	0.01528	-0.00783
124	1/4/2023	0.08755	-0.05209	0.06576	-0.09272	0.04342	0.02312	0.01377
125	1/5/2023	-0.05975	-0.06292	0.06877	0.29562	-0.00832	-0.00207	0.02695
126	1/6/2023	0.23477	0.03368	0.03700	-0.04789	0.05721	0.04093	0.05618
127	1/7/2023	-0.05861	0.06610	-0.01357	0.17160	-0.00635	-0.00723	0.01586
128	1/8/2023	0.05087	-0.04641	-0.02429	-0.02273	0.00844	0.00186	-0.00077
129	1/9/2023	0.05816	-0.02211	-0.03664	-0.05943	0.00057	-0.01924	-0.01392
130	1/10/2023	0.14920	-0.02001	0.04456	0.07692	0.01615	0.00259	0.03394



Lampiran 5 Fuzzifikasi Data Training

<i>t</i>	<i>Date</i>	<i>Return</i> Portofolio	Fuzzifikasi	<i>t</i>	<i>Date</i>	<i>Return</i> Portofolio	Fuzzifikasi
1	1/2/2013	0.00976	A5	53	1/6/2017	0.02094	A5
2	1/3/2013	0.03062	A6	54	1/7/2017	0.00535	A4
3	1/4/2013	0.01701	A5	55	1/8/2017	0.02822	A6
4	1/5/2013	-0.00143	A4	56	1/9/2017	-0.00441	A4
5	1/6/2013	-0.05032	A2	57	1/10/2017	-0.00903	A4
6	1/7/2013	-0.01896	A3	58	1/11/2017	0.02276	A5
7	1/8/2013	-0.01518	A3	59	1/12/2017	-0.01097	A4
8	1/9/2013	0.05438	A7	60	1/1/2018	0.02995	A6
9	1/10/2013	-0.01166	A4	61	1/2/2018	-0.02147	A3
10	1/11/2013	0.00742	A5	62	1/3/2018	0.00291	A4
11	1/12/2013	0.03570	A6	63	1/4/2018	0.00769	A5
12	1/1/2014	0.00470	A4	64	1/5/2018	0.00360	A4
13	1/2/2014	0.04586	A7	65	1/6/2018	0.02060	A5
14	1/3/2014	-0.01423	A3	66	1/7/2018	0.00725	A5
15	1/4/2014	0.02247	A5	67	1/8/2018	-0.00581	A4
16	1/5/2014	-0.03902	A2	68	1/9/2018	0.01406	A5
17	1/6/2014	-0.00979	A4	69	1/10/2018	-0.00936	A4
18	1/7/2014	-0.01809	A3	70	1/11/2018	0.07549	A8
19	1/8/2014	0.01740	A5	71	1/12/2018	-0.07208	A1
20	1/9/2014	-0.03103	A3	72	1/1/2019	0.01980	A5
21	1/10/2014	-0.01594	A3	73	1/2/2019	0.01522	A5
22	1/11/2014	0.01296	A5	74	1/3/2019	-0.02145	A3
23	1/12/2014	-0.06591	A1	75	1/4/2019	0.00697	A5
24	1/1/2015	-0.04534	A2	76	1/5/2019	-0.02550	A3
25	1/2/2015	0.00525	A4	77	1/6/2019	0.00969	A5
26	1/3/2015	-0.04167	A2	78	1/7/2019	-0.01111	A4
27	1/4/2015	0.05839	A7	79	1/8/2019	0.01895	A5
28	1/5/2015	-0.01756	A3	80	1/9/2019	0.00581	A4
29	1/6/2015	0.00239	A4	81	1/10/2019	0.02395	A5
30	1/7/2015	-0.03763	A2	82	1/11/2019	-0.01844	A3
31	1/8/2015	-0.00200	A4	83	1/12/2019	0.01222	A5
32	1/9/2015	-0.04369	A2	84	1/1/2020	-0.04578	A2
33	1/10/2015	0.00961	A5	85	1/2/2020	-0.03567	A2
34	1/11/2015	-0.00566	A4	86	1/3/2020	-0.06447	A1
35	1/12/2015	0.02428	A5	87	1/4/2020	0.08509	A8
36	1/1/2016	-0.00212	A4	88	1/5/2020	0.02531	A5
37	1/2/2016	-0.02468	A3	89	1/6/2020	0.02419	A5
38	1/3/2016	0.06317	A7	90	1/7/2020	0.01330	A5
39	1/4/2016	-0.00126	A4	91	1/8/2020	0.07412	A8
40	1/5/2016	-0.01513	A3	92	1/9/2020	-0.04645	A2





41	1/6/2016	0.05208	A7	93	1/10/2020	0.05135	A7
42	1/7/2016	0.02728	A6	94	1/11/2020	0.03141	A6
43	1/8/2016	-0.00629	A4	95	1/12/2020	-0.00474	A4
44	1/9/2016	0.00966	A5	96	1/1/2021	-0.00800	A4
45	1/10/2016	0.03064	A6	97	1/2/2021	0.03419	A6
46	1/11/2016	0.02284	A5	98	1/3/2021	-0.02751	A3
47	1/12/2016	0.01743	A5	99	1/4/2021	0.05096	A7
48	1/1/2017	0.00046	A4	100	1/5/2021	-0.00773	A4
49	1/2/2017	-0.03236	A3	101	1/6/2021	0.00460	A4
50	1/3/2017	0.03951	A6	102	1/7/2021	0.01674	A5
51	1/4/2017	0.02555	A5	103	1/8/2021	0.04047	A6
52	1/5/2017	0.00244	A4				



Lampiran 6 Hasil *Fuzzy Logic Relationship* (FLR) Data *Training*

<i>t</i>	<i>Date</i>	<i>Return Portofolio</i>	Fuzzifikasi	FLR
1	1/2/2013	0.00976	A5	
2	1/3/2013	0.03062	A6	A5 → A6
3	1/4/2013	0.01701	A5	A6 → A5
4	1/5/2013	-0.00143	A4	A5 → A4
5	1/6/2013	-0.05032	A2	A4 → A2
6	1/7/2013	-0.01896	A3	A2 → A3
7	1/8/2013	-0.01518	A3	A3 → A3
8	1/9/2013	0.05438	A7	A3 → A7
9	1/10/2013	-0.01166	A4	A7 → A4
10	1/11/2013	0.00742	A5	A4 → A5
11	1/12/2013	0.03570	A6	A5 → A6
12	1/1/2014	0.00470	A4	A6 → A4
13	1/2/2014	0.04586	A7	A4 → A7
14	1/3/2014	-0.01423	A3	A7 → A3
15	1/4/2014	0.02247	A5	A3 → A5
16	1/5/2014	-0.03902	A2	A5 → A2
17	1/6/2014	-0.00979	A4	A2 → A4
18	1/7/2014	-0.01809	A3	A4 → A3
19	1/8/2014	0.01740	A5	A3 → A5
20	1/9/2014	-0.03103	A3	A5 → A3
21	1/10/2014	-0.01594	A3	A3 → A3
22	1/11/2014	0.01296	A5	A3 → A5
23	1/12/2014	-0.06591	A1	A5 → A1
24	1/1/2015	-0.04534	A2	A1 → A2
25	1/2/2015	0.00525	A4	A2 → A4
26	1/3/2015	-0.04167	A2	A4 → A2
27	1/4/2015	0.05839	A7	A2 → A7
28	1/5/2015	-0.01756	A3	A7 → A3
29	1/6/2015	0.00239	A4	A3 → A4
30	1/7/2015	-0.03763	A2	A4 → A2
31	1/8/2015	-0.00200	A4	A2 → A4
32	1/9/2015	-0.04369	A2	A4 → A2
33	1/10/2015	0.00961	A5	A2 → A5
34	1/11/2015	-0.00566	A4	A5 → A4
35	1/12/2015	0.02428	A5	A4 → A5
36	1/1/2016	-0.00212	A4	A5 → A4
37	1/2/2016	-0.02468	A3	A4 → A3
38	1/3/2016	0.06317	A7	A3 → A7
39	1/4/2016	-0.00126	A4	A7 → A4
40	1/5/2016	-0.01513	A3	A4 → A3



41	1/6/2016	0.05208	A7	A3 → A7
42	1/7/2016	0.02728	A6	A7 → A6
43	1/8/2016	-0.00629	A4	A6 → A4
44	1/9/2016	0.00966	A5	A4 → A5
45	1/10/2016	0.03064	A6	A5 → A6
46	1/11/2016	0.02284	A5	A6 → A5
47	1/12/2016	0.01743	A5	A5 → A5
48	1/1/2017	0.00046	A4	A5 → A4
49	1/2/2017	-0.03236	A3	A4 → A3
50	1/3/2017	0.03951	A6	A3 → A6
51	1/4/2017	0.02555	A5	A6 → A5
52	1/5/2017	0.00244	A4	A5 → A4
53	1/6/2017	0.02094	A5	A4 → A5
54	1/7/2017	0.00535	A4	A5 → A4
55	1/8/2017	0.02822	A6	A4 → A6
56	1/9/2017	-0.00441	A4	A6 → A4
57	1/10/2017	-0.00903	A4	A4 → A4
58	1/11/2017	0.02276	A5	A4 → A5
59	1/12/2017	-0.01097	A4	A5 → A4
60	1/1/2018	0.02995	A6	A4 → A6
61	1/2/2018	-0.02147	A3	A6 → A3
62	1/3/2018	0.00291	A4	A3 → A4
63	1/4/2018	0.00769	A5	A4 → A5
64	1/5/2018	0.00360	A4	A5 → A4
65	1/6/2018	0.02060	A5	A4 → A5
66	1/7/2018	0.00725	A5	A5 → A5
67	1/8/2018	-0.00581	A4	A5 → A4
68	1/9/2018	0.01406	A5	A4 → A5
69	1/10/2018	-0.00936	A4	A5 → A4
70	1/11/2018	0.07549	A8	A4 → A8
71	1/12/2018	-0.07208	A1	A8 → A1
72	1/1/2019	0.01980	A5	A1 → A5
73	1/2/2019	0.01522	A5	A5 → A5
74	1/3/2019	-0.02145	A3	A5 → A3
75	1/4/2019	0.00697	A5	A3 → A5
76	1/5/2019	-0.02550	A3	A5 → A3
77	1/6/2019	0.00969	A5	A3 → A5
78	1/7/2019	-0.01111	A4	A5 → A4
79	1/8/2019	0.01895	A5	A4 → A5
80	1/9/2019	0.00581	A4	A5 → A4
81	1/10/2019	0.02395	A5	A4 → A5
82	1/11/2019	-0.01844	A3	A5 → A3
83	1/12/2019	0.01222	A5	A3 → A5



84	1/1/2020	-0.04578	A2	A5 → A2
85	1/2/2020	-0.03567	A2	A2 → A2
86	1/3/2020	-0.06447	A1	A2 → A1
87	1/4/2020	0.08509	A8	A1 → A8
88	1/5/2020	0.02531	A5	A8 → A5
89	1/6/2020	0.02419	A5	A5 → A5
90	1/7/2020	0.01330	A5	A5 → A5
91	1/8/2020	0.07412	A8	A5 → A8
92	1/9/2020	-0.04645	A2	A8 → A2
93	1/10/2020	0.05135	A7	A2 → A7
94	1/11/2020	0.03141	A6	A7 → A6
95	1/12/2020	-0.00474	A4	A6 → A4
96	1/1/2021	-0.00800	A4	A4 → A4
97	1/2/2021	0.03419	A6	A4 → A6
98	1/3/2021	-0.02751	A3	A6 → A3
99	1/4/2021	0.05096	A7	A3 → A7
100	1/5/2021	-0.00773	A4	A7 → A4
101	1/6/2021	0.00460	A4	A4 → A4
102	1/7/2021	0.01674	A5	A4 → A5
103	1/8/2021	0.04047	A6	A5 → A6



Lampiran 7 Hasil Prediksi Data *Training* Model Chen dan Model Lee

<i>t</i>	<i>Date</i>	<i>Return</i> Portofolio	Fuzzifikasi	FLR	Prediksi Chen	Prediksi Lee
1	1/2/2013	0.00976	A5			
2	1/3/2013	0.03062	A6	A5 → A6	-0.0005115179	0.0007466164
3	1/4/2013	0.01701	A5	A6 → A5	-0.003318125	-0.0011352083
4	1/5/2013	-0.00143	A4	A5 → A4	-0.0005115179	0.0007466164
5	1/6/2013	-0.05032	A2	A4 → A2	0.016328125	0.0054135417
6	1/7/2013	-0.01896	A3	A2 → A3	-0.009866875	-0.0011352083
7	1/8/2013	-0.01518	A3	A3 → A3	0.016328125	0.020257375
8	1/9/2013	0.05438	A7	A3 → A7	0.016328125	0.020257375
9	1/10/2013	-0.01166	A4	A7 → A4	0.003230625	0.0022950893
10	1/11/2013	0.00742	A5	A4 → A5	0.016328125	0.0054135417
11	1/12/2013	0.03570	A6	A5 → A6	-0.0005115179	0.0007466164
12	1/1/2014	0.00470	A4	A6 → A4	-0.003318125	-0.0011352083
13	1/2/2014	0.04586	A7	A4 → A7	0.016328125	0.0054135417
14	1/3/2014	-0.01423	A3	A7 → A3	0.003230625	0.0022950893
15	1/4/2014	0.02247	A5	A3 → A5	0.016328125	0.020257375
16	1/5/2014	-0.03902	A2	A5 → A2	-0.0005115179	0.0007466164
17	1/6/2014	-0.00979	A4	A2 → A4	-0.009866875	-0.0011352083
18	1/7/2014	-0.01809	A3	A4 → A3	0.016328125	0.0054135417
19	1/8/2014	0.01740	A5	A3 → A5	0.016328125	0.020257375
20	1/9/2014	-0.03103	A3	A5 → A3	-0.0005115179	0.0007466164
21	1/10/2014	-0.01594	A3	A3 → A3	0.016328125	0.020257375
22	1/11/2014	0.01296	A5	A3 → A5	0.016328125	0.020257375
23	1/12/2014	-0.06591	A1	A5 → A1	-0.0005115179	0.0007466164
24	1/1/2015	-0.04534	A2	A1 → A2	0.016328125	0.016328125
25	1/2/2015	0.00525	A4	A2 → A4	-0.009866875	-0.0011352083
26	1/3/2015	-0.04167	A2	A4 → A2	0.016328125	0.0054135417
27	1/4/2015	0.05839	A7	A2 → A7	-0.009866875	-0.0011352083
28	1/5/2015	-0.01756	A3	A7 → A3	0.003230625	0.0022950893
29	1/6/2015	0.00239	A4	A3 → A4	0.016328125	0.020257375
30	1/7/2015	-0.03763	A2	A4 → A2	0.016328125	0.0054135417
31	1/8/2015	-0.00200	A4	A2 → A4	-0.009866875	-0.0011352083
32	1/9/2015	-0.04369	A2	A4 → A2	0.016328125	0.0054135417
33	1/10/2015	0.00961	A5	A2 → A5	-0.009866875	-0.0011352083
34	1/11/2015	-0.00566	A4	A5 → A4	-0.0005115179	0.0007466164
35	1/12/2015	0.02428	A5	A4 → A5	0.016328125	0.0054135417
36	1/1/2016	-0.00212	A4	A5 → A4	-0.0005115179	0.0007466164
37	1/2/2016	-0.02468	A3	A4 → A3	0.016328125	0.0054135417
38	1/3/2016	0.06317	A7	A3 → A7	0.016328125	0.020257375
39	1/4/2016	-0.00126	A4	A7 → A4	0.003230625	0.0022950893
40	1/5/2016	-0.01513	A3	A4 → A3	0.016328125	0.0054135417



41	1/6/2016	0.05208	A7	A3 → A7	0.016328125	0.020257375
42	1/7/2016	0.02728	A6	A7 → A6	0.003230625	0.0022950893
43	1/8/2016	-0.00629	A4	A6 → A4	-0.003318125	-0.0011352083
44	1/9/2016	0.00966	A5	A4 → A5	0.016328125	0.0054135417
45	1/10/2016	0.03064	A6	A5 → A6	-0.0005115179	0.0007466164
46	1/11/2016	0.02284	A5	A6 → A5	-0.003318125	-0.0011352083
47	1/12/2016	0.01743	A5	A5 → A5	-0.0005115179	0.0007466164
48	1/1/2017	0.00046	A4	A5 → A4	-0.0005115179	0.0007466164
49	1/2/2017	-0.03236	A3	A4 → A3	0.016328125	0.0054135417
50	1/3/2017	0.03951	A6	A3 → A6	0.016328125	0.020257375
51	1/4/2017	0.02555	A5	A6 → A5	-0.003318125	-0.0011352083
52	1/5/2017	0.00244	A4	A5 → A4	-0.0005115179	0.0007466164
53	1/6/2017	0.02094	A5	A4 → A5	0.016328125	0.0054135417
54	1/7/2017	0.00535	A4	A5 → A4	-0.0005115179	0.0007466164
55	1/8/2017	0.02822	A6	A4 → A6	0.016328125	0.0054135417
56	1/9/2017	-0.00441	A4	A6 → A4	-0.003318125	-0.0011352083
57	1/10/2017	-0.00903	A4	A4 → A4	0.016328125	0.0054135417
58	1/11/2017	0.02276	A5	A4 → A5	0.016328125	0.0054135417
59	1/12/2017	-0.01097	A4	A5 → A4	-0.0005115179	0.0007466164
60	1/1/2018	0.02995	A6	A4 → A6	0.016328125	0.0054135417
61	1/2/2018	-0.02147	A3	A6 → A3	-0.003318125	-0.0011352083
62	1/3/2018	0.00291	A4	A3 → A4	0.016328125	0.020257375
63	1/4/2018	0.00769	A5	A4 → A5	0.016328125	0.0054135417
64	1/5/2018	0.00360	A4	A5 → A4	-0.0005115179	0.0007466164
65	1/6/2018	0.02060	A5	A4 → A5	0.016328125	0.0054135417
66	1/7/2018	0.00725	A5	A5 → A5	-0.0005115179	0.0007466164
67	1/8/2018	-0.00581	A4	A5 → A4	-0.0005115179	0.0007466164
68	1/9/2018	0.01406	A5	A4 → A5	0.016328125	0.0054135417
69	1/10/2018	-0.00936	A4	A5 → A4	-0.0005115179	0.0007466164
70	1/11/2018	0.07549	A8	A4 → A8	0.016328125	0.0054135417
71	1/12/2018	-0.07208	A1	A8 → A1	-0.029513125	-0.029513125
72	1/1/2019	0.01980	A5	A1 → A5	0.016328125	0.016328125
73	1/2/2019	0.01522	A5	A5 → A5	-0.0005115179	0.0007466164
74	1/3/2019	-0.02145	A3	A5 → A3	-0.0005115179	0.0007466164
75	1/4/2019	0.00697	A5	A3 → A5	0.016328125	0.020257375
76	1/5/2019	-0.02550	A3	A5 → A3	-0.0005115179	0.0007466164
77	1/6/2019	0.00969	A5	A3 → A5	0.016328125	0.020257375
78	1/7/2019	-0.01111	A4	A5 → A4	-0.0005115179	0.0007466164
79	1/8/2019	0.01895	A5	A4 → A5	0.016328125	0.0054135417
		0.00581	A4	A5 → A4	-0.0005115179	0.0007466164
		0.02395	A5	A4 → A5	0.016328125	0.0054135417
		-0.01844	A3	A5 → A3	-0.0005115179	0.0007466164
		0.01222	A5	A3 → A5	0.016328125	0.020257375



84	1/1/2020	-0.04578	A2	A5 → A2	-0.0005115179	0.0007466164
85	1/2/2020	-0.03567	A2	A2 → A2	-0.009866875	-0.0011352083
86	1/3/2020	-0.06447	A1	A2 → A1	-0.009866875	-0.0011352083
87	1/4/2020	0.08509	A8	A1 → A8	0.016328125	0.016328125
88	1/5/2020	0.02531	A5	A8 → A5	-0.029513125	-0.029513125
89	1/6/2020	0.02419	A5	A5 → A5	-0.0005115179	0.0007466164
90	1/7/2020	0.01330	A5	A5 → A5	-0.0005115179	0.0007466164
91	1/8/2020	0.07412	A8	A5 → A8	-0.0005115179	0.0007466164
92	1/9/2020	-0.04645	A2	A8 → A2	-0.029513125	-0.029513125
93	1/10/2020	0.05135	A7	A2 → A7	-0.009866875	-0.0011352083
94	1/11/2020	0.03141	A6	A7 → A6	0.003230625	0.0022950893
95	1/12/2020	-0.00474	A4	A6 → A4	-0.003318125	-0.0011352083
96	1/1/2021	-0.00800	A4	A4 → A4	0.016328125	0.0054135417
97	1/2/2021	0.03419	A6	A4 → A6	0.016328125	0.0054135417
98	1/3/2021	-0.02751	A3	A6 → A3	-0.003318125	-0.0011352083
99	1/4/2021	0.05096	A7	A3 → A7	0.016328125	0.020257375
100	1/5/2021	-0.00773	A4	A7 → A4	0.003230625	0.0022950893
101	1/6/2021	0.00460	A4	A4 → A4	0.016328125	0.0054135417
102	1/7/2021	0.01674	A5	A4 → A5	0.016328125	0.0054135417
103	1/8/2021	0.04047	A6	A5 → A6	-0.0005115179	0.0007466164



Lampiran 8 Hasil perhitungan RMSE dari hasil prediksi data *training* model Chen

$t$	Date	Return Portofolio	Hasil Prediksi	$(Y_t - F_t)^2$
1	1/2/2013	0.00976		
2	1/3/2013	0.03062	-0.0005115179	0.00096894
3	1/4/2013	0.01701	-0.003318125	0.00041319
4	1/5/2013	-0.00143	-0.0005115179	0.00000085
5	1/6/2013	-0.05032	0.016328125	0.00444238
6	1/7/2013	-0.01896	-0.009866875	0.00008273
7	1/8/2013	-0.01518	0.016328125	0.00099263
8	1/9/2013	0.05438	0.016328125	0.00144812
9	1/10/2013	-0.01166	0.003230625	0.00022175
10	1/11/2013	0.00742	0.016328125	0.00007930
11	1/12/2013	0.03570	-0.0005115179	0.00131098
12	1/1/2014	0.00470	-0.003318125	0.00006423
13	1/2/2014	0.04586	0.016328125	0.00087201
14	1/3/2014	-0.01423	0.003230625	0.00030474
15	1/4/2014	0.02247	0.016328125	0.00003776
16	1/5/2014	-0.03902	-0.0005115179	0.00148317
17	1/6/2014	-0.00979	-0.009866875	0.00000001
18	1/7/2014	-0.01809	0.016328125	0.00118463
19	1/8/2014	0.01740	0.016328125	0.00000114
20	1/9/2014	-0.03103	-0.0005115179	0.00093120
21	1/10/2014	-0.01594	0.016328125	0.00104150
22	1/11/2014	0.01296	0.016328125	0.00001137
23	1/12/2014	-0.06591	-0.0005115179	0.00427750
24	1/1/2015	-0.04534	0.016328125	0.00380313
25	1/2/2015	0.00525	-0.009866875	0.00022859
26	1/3/2015	-0.04167	0.016328125	0.00336425
27	1/4/2015	0.05839	-0.009866875	0.00465860
28	1/5/2015	-0.01756	0.003230625	0.00043234
29	1/6/2015	0.00239	0.016328125	0.00019435
30	1/7/2015	-0.03763	0.016328125	0.00291185
31	1/8/2015	-0.00200	-0.009866875	0.00006189
32	1/9/2015	-0.04369	0.016328125	0.00360213
33	1/10/2015	0.00961	-0.009866875	0.00037919
34	1/11/2015	-0.00566	-0.0005115179	0.00002647
35	1/12/2015	0.02428	0.016328125	0.00006329
36	1/1/2016	-0.00212	-0.0005115179	0.00000259
37	1/2/2016	-0.02468	0.016328125	0.00168181
38	1/3/2016	0.06317	0.016328125	0.00219375
39	1/4/2016	-0.00126	0.003230625	0.00002014
40	1/5/2016	-0.01513	0.016328125	0.00098978





41	1/6/2016	0.05208	0.016328125	0.00127823
42	1/7/2016	0.02728	0.003230625	0.00057822
43	1/8/2016	-0.00629	-0.003318125	0.00000880
44	1/9/2016	0.00966	0.016328125	0.00004449
45	1/10/2016	0.03064	-0.0005115179	0.00097012
46	1/11/2016	0.02284	-0.003318125	0.00068449
47	1/12/2016	0.01743	-0.0005115179	0.00032182
48	1/1/2017	0.00046	-0.0005115179	0.00000095
49	1/2/2017	-0.03236	0.016328125	0.00237084
50	1/3/2017	0.03951	0.016328125	0.00053732
51	1/4/2017	0.02555	-0.003318125	0.00083351
52	1/5/2017	0.00244	-0.0005115179	0.00000871
53	1/6/2017	0.02094	0.016328125	0.00002129
54	1/7/2017	0.00535	-0.0005115179	0.00003435
55	1/8/2017	0.02822	0.016328125	0.00014134
56	1/9/2017	-0.00441	-0.003318125	0.00000119
57	1/10/2017	-0.00903	0.016328125	0.00064289
58	1/11/2017	0.02276	0.016328125	0.00004143
59	1/12/2017	-0.01097	-0.0005115179	0.00010945
60	1/1/2018	0.02995	0.016328125	0.00018544
61	1/2/2018	-0.02147	-0.003318125	0.00032937
62	1/3/2018	0.00291	0.016328125	0.00018005
63	1/4/2018	0.00769	0.016328125	0.00007468
64	1/5/2018	0.00360	-0.0005115179	0.00001689
65	1/6/2018	0.02060	0.016328125	0.00001826
66	1/7/2018	0.00725	-0.0005115179	0.00006020
67	1/8/2018	-0.00581	-0.0005115179	0.00002812
68	1/9/2018	0.01406	0.016328125	0.00000516
69	1/10/2018	-0.00936	-0.0005115179	0.00007827
70	1/11/2018	0.07549	0.016328125	0.00349988
71	1/12/2018	-0.07208	-0.029513125	0.00181191
72	1/1/2019	0.01980	0.016328125	0.00001208
73	1/2/2019	0.01522	-0.0005115179	0.00024738
74	1/3/2019	-0.02145	-0.0005115179	0.00043858
75	1/4/2019	0.00697	0.016328125	0.00008748
76	1/5/2019	-0.02550	-0.0005115179	0.00062439
77	1/6/2019	0.00969	0.016328125	0.00004401
78	1/7/2019	-0.01111	-0.0005115179	0.00011223
79	1/8/2019	0.01895	0.016328125	0.00000685
80	1/9/2019	0.00581	-0.0005115179	0.00003993
81	1/10/2019	0.02395	0.016328125	0.00005807
82	1/11/2019	-0.01844	-0.0005115179	0.00032151
83	1/12/2019	0.01222	0.016328125	0.00001689



84	1/1/2020	-0.04578	-0.0005115179	0.00204942
85	1/2/2020	-0.03567	-0.009866875	0.00066561
86	1/3/2020	-0.06447	-0.009866875	0.00298162
87	1/4/2020	0.08509	0.016328125	0.00472823
88	1/5/2020	0.02531	-0.029513125	0.00300606
89	1/6/2020	0.02419	-0.0005115179	0.00061012
90	1/7/2020	0.01330	-0.0005115179	0.00019087
91	1/8/2020	0.07412	-0.0005115179	0.00557012
92	1/9/2020	-0.04645	-0.029513125	0.00028693
93	1/10/2020	0.05135	-0.009866875	0.00374770
94	1/11/2020	0.03141	0.003230625	0.00079434
95	1/12/2020	-0.00474	-0.003318125	0.00000203
96	1/1/2021	-0.00800	0.016328125	0.00059162
97	1/2/2021	0.03419	0.016328125	0.00031906
98	1/3/2021	-0.02751	-0.003318125	0.00058514
99	1/4/2021	0.05096	0.016328125	0.00119908
100	1/5/2021	-0.00773	0.003230625	0.00012005
101	1/6/2021	0.00460	0.016328125	0.00013755
102	1/7/2021	0.01674	0.016328125	0.00000017
103	1/8/2021	0.04047	-0.0005115179	0.00167968
RMSE	$\sqrt{\frac{1}{N} \sum_{t=1}^N (Y_t - F_t)^2}$			0.02986518



Lampiran 9 Hasil perhitungan RMSE dari hasil prediksi data *training* model Lee

$t$	Date	Return Portofolio	Hasil Prediksi	$(Y_t - F_t)^2$
1	1/2/2013	0.00976		
2	1/3/2013	0.03062	0.0007466164	0.00089220
3	1/4/2013	0.01701	-0.0011352083	0.00032921
4	1/5/2013	-0.00143	0.0007466164	0.00000474
5	1/6/2013	-0.05032	0.0054135417	0.00310657
6	1/7/2013	-0.01896	-0.0011352083	0.00031781
7	1/8/2013	-0.01518	0.020257375	0.00125566
8	1/9/2013	0.05438	0.020257375	0.00116451
9	1/10/2013	-0.01166	0.0022950893	0.00019476
10	1/11/2013	0.00742	0.0054135417	0.00000404
11	1/12/2013	0.03570	0.0007466164	0.00122146
12	1/1/2014	0.00470	-0.0011352083	0.00003401
13	1/2/2014	0.04586	0.0054135417	0.00163574
14	1/3/2014	-0.01423	0.0022950893	0.00027295
15	1/4/2014	0.02247	0.020257375	0.00000491
16	1/5/2014	-0.03902	0.0007466164	0.00158166
17	1/6/2014	-0.00979	-0.0011352083	0.00007493
18	1/7/2014	-0.01809	0.0054135417	0.00055243
19	1/8/2014	0.01740	0.020257375	0.00000819
20	1/9/2014	-0.03103	0.0007466164	0.00100957
21	1/10/2014	-0.01594	0.020257375	0.00131055
22	1/11/2014	0.01296	0.020257375	0.00005330
23	1/12/2014	-0.06591	0.0007466164	0.00444365
24	1/1/2015	-0.04534	0.016328125	0.00380313
25	1/2/2015	0.00525	-0.0011352083	0.00004080
26	1/3/2015	-0.04167	0.0054135417	0.00221724
27	1/4/2015	0.05839	-0.0011352083	0.00354290
28	1/5/2015	-0.01756	0.0022950893	0.00039431
29	1/6/2015	0.00239	0.020257375	0.00031935
30	1/7/2015	-0.03763	0.0054135417	0.00185304
31	1/8/2015	-0.00200	-0.0011352083	0.00000075
32	1/9/2015	-0.04369	0.0054135417	0.00241112
33	1/10/2015	0.00961	-0.0011352083	0.00011537
34	1/11/2015	-0.00566	0.0007466164	0.00004100
35	1/12/2015	0.02428	0.0054135417	0.00035607
36	1/1/2016	-0.00212	0.0007466164	0.00000822
37	1/2/2016	-0.02468	0.0054135417	0.00090573
38	1/3/2016	0.06317	0.020257375	0.00184111
39	1/4/2016	-0.00126	0.0022950893	0.00001262
40	1/5/2016	-0.01513	0.0054135417	0.00042215



41	1/6/2016	0.05208	0.020257375	0.00101271
42	1/7/2016	0.02728	0.0022950893	0.00062409
43	1/8/2016	-0.00629	-0.0011352083	0.00002652
44	1/9/2016	0.00966	0.0054135417	0.00001801
45	1/10/2016	0.03064	0.0007466164	0.00089333
46	1/11/2016	0.02284	-0.0011352083	0.00057503
47	1/12/2016	0.01743	0.0007466164	0.00027826
48	1/1/2017	0.00046	0.0007466164	0.00000008
49	1/2/2017	-0.03236	0.0054135417	0.00142708
50	1/3/2017	0.03951	0.020257375	0.00037060
51	1/4/2017	0.02555	-0.0011352083	0.00071223
52	1/5/2017	0.00244	0.0007466164	0.00000287
53	1/6/2017	0.02094	0.0054135417	0.00024115
54	1/7/2017	0.00535	0.0007466164	0.00002119
55	1/8/2017	0.02822	0.0054135417	0.00051999
56	1/9/2017	-0.00441	-0.0011352083	0.00001073
57	1/10/2017	-0.00903	0.0054135417	0.00020853
58	1/11/2017	0.02276	0.0054135417	0.00030107
59	1/12/2017	-0.01097	0.0007466164	0.00013736
60	1/1/2018	0.02995	0.0054135417	0.00060183
61	1/2/2018	-0.02147	-0.0011352083	0.00041337
62	1/3/2018	0.00291	0.020257375	0.00030094
63	1/4/2018	0.00769	0.0054135417	0.00000517
64	1/5/2018	0.00360	0.0007466164	0.00000813
65	1/6/2018	0.02060	0.0054135417	0.00023067
66	1/7/2018	0.00725	0.0007466164	0.00004226
67	1/8/2018	-0.00581	0.0007466164	0.00004305
68	1/9/2018	0.01406	0.0054135417	0.00007469
69	1/10/2018	-0.00936	0.0007466164	0.00010211
70	1/11/2018	0.07549	0.0054135417	0.00491042
71	1/12/2018	-0.07208	-0.029513125	0.00181191
72	1/1/2019	0.01980	0.016328125	0.00001208
73	1/2/2019	0.01522	0.0007466164	0.00020939
74	1/3/2019	-0.02145	0.0007466164	0.00049286
75	1/4/2019	0.00697	0.020257375	0.00017643
76	1/5/2019	-0.02550	0.0007466164	0.00068884
77	1/6/2019	0.00969	0.020257375	0.00011158
78	1/7/2019	-0.01111	0.0007466164	0.00014047
79	1/8/2019	0.01895	0.0054135417	0.00018310
80	1/9/2019	0.00581	0.0007466164	0.00002561
81	1/10/2019	0.02395	0.0054135417	0.00034355
82	1/11/2019	-0.01844	0.0007466164	0.00036821
83	1/12/2019	0.01222	0.020257375	0.00006463



84	1/1/2020	-0.04578	0.0007466164	0.00216491
85	1/2/2020	-0.03567	-0.0011352083	0.00119239
86	1/3/2020	-0.06447	-0.0011352083	0.00401144
87	1/4/2020	0.08509	0.016328125	0.00472823
88	1/5/2020	0.02531	-0.029513125	0.00300606
89	1/6/2020	0.02419	0.0007466164	0.00054955
90	1/7/2020	0.01330	0.0007466164	0.00015769
91	1/8/2020	0.07412	0.0007466164	0.00538391
92	1/9/2020	-0.04645	-0.029513125	0.00028693
93	1/10/2020	0.05135	-0.0011352083	0.00275486
94	1/11/2020	0.03141	0.0022950893	0.00084794
95	1/12/2020	-0.00474	-0.0011352083	0.00001301
96	1/1/2021	-0.00800	0.0054135417	0.00017979
97	1/2/2021	0.03419	0.0054135417	0.00082810
98	1/3/2021	-0.02751	-0.0011352083	0.00069551
99	1/4/2021	0.05096	0.020257375	0.00094239
100	1/5/2021	-0.00773	0.0022950893	0.00010043
101	1/6/2021	0.00460	0.0054135417	0.00000066
102	1/7/2021	0.01674	0.0054135417	0.00012827
103	1/8/2021	0.04047	0.0007466164	0.00157813
RMSE	$\sqrt{\frac{1}{N} \sum_{t=1}^N (Y_t - F_t)^2}$			0.02904528



Lampiran 10 Hasil Prediksi Data *Testing* Model Chen

<i>t</i>	<i>Date</i>	<i>Return</i> Portofolio	Fuzzifikasi	FLR	Hasil Prediksi
1	1/9/2021	0.03163	A6		
2	1/10/2021	0.02268	A5	A6 → A5	-0.003318125
3	1/11/2021	-0.05900	A1	A5 → A1	-0.0005115179
4	1/12/2021	-0.02309	A3	A1 → A3	0.016328125
5	1/1/2022	0.04062	A6	A3 → A6	0.016328125
6	1/2/2022	-0.01702	A3	A6 → A3	-0.003318125
7	1/3/2022	0.06190	A7	A3 → A7	0.016328125
8	1/4/2022	0.02554	A5	A7 → A5	0.003230625
9	1/5/2022	0.02769	A6	A5 → A6	-0.0005115179
10	1/6/2022	-0.05943	A1	A6 → A1	-0.003318125
11	1/7/2022	0.04968	A7	A1 → A7	0.016328125
12	1/8/2022	0.03078	A6	A7 → A6	0.003230625
13	1/9/2022	-0.03561	A2	A6 → A2	-0.003318125
14	1/10/2022	0.02800	A6	A2 → A6	-0.009866875
15	1/11/2022	0.06568	A8	A6 → A8	-0.003318125
16	1/12/2022	-0.05248	A1	A8 → A1	-0.029513125
17	1/1/2023	-0.05733	A1	A1 → A1	0.016328125
18	1/2/2023	0.02207	A5	A1 → A5	0.016328125
19	1/3/2023	-0.00783	A4	A5 → A4	-0.0005115179
20	1/4/2023	0.01377	A5	A4 → A5	0.016328125
21	1/5/2023	0.02695	A6	A5 → A6	-0.0005115179
22	1/6/2023	0.05618	A7	A6 → A7	-0.003318125
23	1/7/2023	0.01586	A5	A7 → A5	0.003230625
24	1/8/2023	-0.00077	A4	A5 → A4	-0.0005115179
25	1/9/2023	-0.01392	A3	A4 → A3	0.016328125
26	1/10/2023	0.03394	A6	A3 → A6	0.016328125



Lampiran 11 Hasil Prediksi Data *Testing* Model Lee

<i>t</i>	<i>Date</i>	<i>Return</i> Portofolio	Fuzzifikasi	FLR	Hasil Prediksi
1	1/9/2021	0.03163	A6		
2	1/10/2021	0.02268	A5	A6 → A5	-0.0011352083
3	1/11/2021	-0.05900	A1	A5 → A1	0.0007466164
4	1/12/2021	-0.02309	A3	A1 → A3	0.016328125
5	1/1/2022	0.04062	A6	A3 → A6	0.020257375
6	1/2/2022	-0.01702	A3	A6 → A3	-0.0011352083
7	1/3/2022	0.06190	A7	A3 → A7	0.020257375
8	1/4/2022	0.02554	A5	A7 → A5	0.0022950893
9	1/5/2022	0.02769	A6	A5 → A6	0.0007466164
10	1/6/2022	-0.05943	A1	A6 → A1	-0.0011352083
11	1/7/2022	0.04968	A7	A1 → A7	0.016328125
12	1/8/2022	0.03078	A6	A7 → A6	0.0022950893
13	1/9/2022	-0.03561	A2	A6 → A2	-0.0011352083
14	1/10/2022	0.02800	A6	A2 → A6	-0.0011352083
15	1/11/2022	0.06568	A8	A6 → A8	-0.0011352083
16	1/12/2022	-0.05248	A1	A8 → A1	-0.029513125
17	1/1/2023	-0.05733	A1	A1 → A1	0.016328125
18	1/2/2023	0.02207	A5	A1 → A5	0.016328125
19	1/3/2023	-0.00783	A4	A5 → A4	0.0007466164
20	1/4/2023	0.01377	A5	A4 → A5	0.0054135417
21	1/5/2023	0.02695	A6	A5 → A6	0.0007466164
22	1/6/2023	0.05618	A7	A6 → A7	-0.0011352083
23	1/7/2023	0.01586	A5	A7 → A5	0.0022950893
24	1/8/2023	-0.00077	A4	A5 → A4	0.0007466164
25	1/9/2023	-0.01392	A3	A4 → A3	0.0054135417
26	1/10/2023	0.03394	A6	A3 → A6	0.020257375



Lampiran 12 Hasil perhitungan RMSE dari hasil prediksi data *testing* model Chen

$t$	Date	Return Portofolio	Hasil Prediksi	$(Y_t - F_t)^2$
1	1/9/2021	0.03163		
2	1/10/2021	0.02268	-0.003318125	0.00067597
3	1/11/2021	-0.05900	-0.0005115179	0.00342086
4	1/12/2021	-0.02309	0.016328125	0.00155381
5	1/1/2022	0.04062	0.016328125	0.00058996
6	1/2/2022	-0.01702	-0.003318125	0.00018765
7	1/3/2022	0.06190	0.016328125	0.00207715
8	1/4/2022	0.02554	0.003230625	0.00049771
9	1/5/2022	0.02769	-0.0005115179	0.00079510
10	1/6/2022	-0.05943	-0.003318125	0.00314894
11	1/7/2022	0.04968	0.016328125	0.00111228
12	1/8/2022	0.03078	0.003230625	0.00075909
13	1/9/2022	-0.03561	-0.003318125	0.00104285
14	1/10/2022	0.02800	-0.009866875	0.00143417
15	1/11/2022	0.06568	-0.003318125	0.00476039
16	1/12/2022	-0.05248	-0.029513125	0.00052737
17	1/1/2023	-0.05733	0.016328125	0.00542480
18	1/2/2023	0.02207	0.016328125	0.00003300
19	1/3/2023	-0.00783	-0.0005115179	0.00005362
20	1/4/2023	0.01377	0.016328125	0.00000654
21	1/5/2023	0.02695	-0.0005115179	0.00075395
22	1/6/2023	0.05618	-0.003318125	0.00354044
23	1/7/2023	0.01586	0.003230625	0.00015951
24	1/8/2023	-0.00077	-0.0005115179	0.00000007
25	1/9/2023	-0.01392	0.016328125	0.00091516
26	1/10/2023	0.03394	0.016328125	0.00031008
RMSE	$\sqrt{\frac{1}{N} \sum_{t=1}^N (Y_t - F_t)^2}$			0.03675893





Lampiran 13 Hasil perhitungan RMSE dari hasil prediksi data *testing* model Lee

$t$	Date	Return Portofolio	Hasil Prediksi	$(Y_t - F_t)^2$
1	1/9/2021	0.03163		
2	1/10/2021	0.02268	-0.0011352083	0.00056723
3	1/11/2021	-0.05900	0.0007466164	0.00356961
4	1/12/2021	-0.02309	0.016328125	0.00155381
5	1/1/2022	0.04062	0.020257375	0.00041452
6	1/2/2022	-0.01702	-0.0011352083	0.00025223
7	1/3/2022	0.06190	0.020257375	0.00173443
8	1/4/2022	0.02554	0.0022950893	0.00054033
9	1/5/2022	0.02769	0.0007466164	0.00072573
10	1/6/2022	-0.05943	-0.0011352083	0.00339870
11	1/7/2022	0.04968	0.016328125	0.00111228
12	1/8/2022	0.03078	0.0022950893	0.00081152
13	1/9/2022	-0.03561	-0.0011352083	0.00118860
14	1/10/2022	0.02800	-0.0011352083	0.00084907
15	1/11/2022	0.06568	-0.0011352083	0.00446393
16	1/12/2022	-0.05248	-0.029513125	0.00052737
17	1/1/2023	-0.05733	0.016328125	0.00542480
18	1/2/2023	0.02207	0.016328125	0.00003300
19	1/3/2023	-0.00783	0.0007466164	0.00007363
20	1/4/2023	0.01377	0.0054135417	0.00006983
21	1/5/2023	0.02695	0.0007466164	0.00068644
22	1/6/2023	0.05618	-0.0011352083	0.00328543
23	1/7/2023	0.01586	0.0022950893	0.00018402
24	1/8/2023	-0.00077	0.0007466164	0.00000229
25	1/9/2023	-0.01392	0.0054135417	0.00037392
26	1/10/2023	0.03394	0.020257375	0.00018714
RMSE	$\sqrt{\frac{1}{N} \sum_{t=1}^N (Y_t - F_t)^2}$			0.03579377

