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# LAMPIRAN

**Lampiran 1.** Data Harga Penutupan Saham PT. Indosat Tbk dan PT. Smartfren Telecom Tbk.

Tanggal	PT. Indosat Tbk	PT. Smartfren Telecom Tbk	Tanggal	PT. Indosat Tbk	PT. Smartfren Telecom Tbk
3/11/2019	2770	292	7/8/2019	2630	312
3/12/2019	2670	294	7/9/2019	2630	320
3/13/2019	2790	310	7/10/2019	2830	312
3/14/2019	2710	350	7/11/2019	2770	318
3/15/2019	2740	336	7/12/2019	2700	312
3/18/2019	2910	346	7/15/2019	2760	318
3/19/2019	3010	348	7/16/2019	2890	320
3/20/2019	2920	336	7/17/2019	2820	312
3/21/2019	2870	304	7/18/2019	2760	310
3/22/2019	2830	324	7/19/2019	2760	308
3/25/2019	2630	330	7/22/2019	2790	306
3/26/2019	2560	328	7/23/2019	2740	230
3/27/2019	2550	324	7/24/2019	2730	200
3/28/2019	2580	326	7/25/2019	3040	202
3/29/2019	2510	312	7/26/2019	3140	199
4/1/2019	2390	286	7/29/2019	3360	165
4/2/2019	2330	286	7/30/2019	3370	181
4/3/2019	2330	286	7/31/2019	3410	173
⋮	⋮	⋮	⋮	⋮	⋮
7/1/2019	2810	318	3/4/2020	2260	93
7/2/2019	2730	314	3/5/2020	2240	96
7/3/2019	2580	314	3/6/2020	2160	92
7/4/2019	2660	320	3/9/2020	2000	80
7/5/2019	2710	316	3/10/2020	2030	81

**Lampiran 2.** Nilai *Return* Saham PT. Indosat Tbk dan PT. Smartfren Telecom Tbk.

Waktu (t)	<i>Return</i> PT. Indosat Tbk	<i>Return</i> PT. Smartfren Telecom Tbk
1	-0.0361	0.0068
2	0.0449	0.0544
3	-0.0287	0.1290
4	0.0111	-0.0400
5	0.0620	0.0298
6	0.0344	0.0058
7	-0.0299	-0.0345
8	-0.0171	-0.0952
9	-0.0139	0.0658
10	-0.0707	0.0185
11	-0.0266	-0.0061
12	-0.0039	-0.0122
13	0.0118	0.0062
14	-0.0271	-0.0429
15	-0.0478	-0.0833
16	-0.0251	0.0000
17	0.0000	0.0000
18	0.0343	-0.0490
19	0.0871	-0.0588
20	-0.0267	-0.0703
21	0.0078	0.0924
22	0.0039	-0.0077
23	0.0039	-0.0078
24	0.0618	-0.0078
25	-0.0145	0.0000
26	0.0000	0.0000
27	0.0000	0.0000
28	0.0111	0.1417
...	...	...
252	0.0335	0.0215
253	0.0463	-0.0211
254	-0.0088	0.0323
255	-0.0357	-0.0417
256	-0.0741	-0.1304
257	0.0150	0.0125

**Lampiran 3.** Output Koefisien Korelasi *Kendall's Tau*

```
> cor.test(return$sri, return$rf, method="kendall")
```

```
    kendall's rank correlation tau
```

```
data:  return$sri and return$rf
```

```
z = 2.1365, p-value = 0.03264
```

```
alternative hypothesis: true tau is not equal to 0
```

```
sample estimates:
```

```
    tau
```

```
0.09037397
```

**Lampiran 4.** Estimasi Parameter Copula Ali-Mikhail-Haq dengan Korelasi Kendall's Tau

$$\tau = 1 + 4 \int_0^1 \frac{\ln\left(\frac{1-\theta+\theta t}{t}\right) t(1-\theta+\theta t)}{-1+\theta} dt$$

$$\int_0^1 \frac{\ln\left(\frac{1-\theta+\theta t}{t}\right) t(1-\theta+\theta t)}{-1+\theta} dt$$

$$\int u dv = uv - \left( \int v du \right)$$

Misalkan :

$$u = \ln\left(\frac{1-\theta+\theta t}{t}\right)$$

$$du = \frac{\left(\frac{\theta}{t} - \frac{1-\theta+\theta t}{t^2}\right) t}{1-\theta+\theta t}$$

$$dv = t(1-\theta+\theta t)$$

$$v = \int t(1-\theta+\theta t)$$

$$v = \frac{\theta t^3}{3} + \frac{(1-\theta)t^2}{2}$$

$$\int \ln\left(\frac{1-\theta+\theta t}{t}\right) t(1-\theta+\theta t) dt = \ln\left(\frac{1-\theta+\theta t}{t}\right) \left(\frac{\theta t^3}{3} + \frac{(1-\theta)t^2}{2}\right)$$

$$- \left( \int \frac{\left(\frac{\theta t^3}{3} + \frac{(1-\theta)t^2}{2}\right) \left(\frac{\theta}{t} - \frac{1-\theta+\theta t}{t^2}\right) t}{1-\theta+\theta t} dt \right)$$

$$= \frac{1}{-1+\theta} \left( \lim_{t \rightarrow 0^+} \ln\left(\frac{1-\theta+\theta t}{t}\right) \left(\frac{\theta t^3}{3} + \frac{(1-\theta)t^2}{2}\right) \right.$$

$$\left. - \left( \int_0^1 \left( \left(-\frac{1}{3} + \frac{\theta}{3}\right) t - \frac{(-1+\theta)^2}{6\theta} - \frac{(\theta^2 - 2\theta + 1)(-1+\theta)}{\theta(6-6\theta+6\theta t)} \right) dt \right) \right)$$

**Lanjutan**

**Lampiran 4.** Estimasi Parameter Copula Ali-Mikhail-Haq dengan Korelasi Kendall's Tau

$$= \frac{1}{-1 + \theta} \left( \lim_{t \rightarrow 0^+} \ln \left( \frac{1 - \theta + \theta t}{t} \right) \left( \frac{\theta t^3}{3} + \frac{(1 - \theta)t^2}{2} \right) - \left( \int_0^1 \left( -\frac{1}{3} + \frac{\theta}{3} \right) t dt \right) - \left( \int_0^1 -\frac{(-1 + \theta)^2}{6\theta} dt \right) - \left( \int_0^1 -\frac{(\theta^2 - 2\theta + 1)(-1 + \theta)}{\theta(6 - 6\theta + 6\theta t)} dt \right) \right)$$

- Untuk  $\int_0^1 \left( -\frac{1}{3} + \frac{\theta}{3} \right) t dt$

$$\int C f(t) dt = C \left( \int f(t) dt \right)$$

$$\int \left( -\frac{1}{3} + \frac{\theta}{3} \right) t dt = \left( -\frac{1}{3} + \frac{\theta}{3} \right) \left( \int t dt \right)$$

$$-\frac{1}{3} + \frac{\theta}{3} \int_0^1 t dt$$

$$-\frac{1}{3} + \frac{\theta}{3} \left( \frac{1}{2} \right)$$

$$-\frac{1}{6} + \frac{\theta}{6}$$

- Untuk  $\int_0^1 -\frac{(-1+\theta)^2}{6\theta} dt$

$$\int C dt = Ct$$

$$\int -\frac{(-1 + \theta)^2}{6\theta} dt = -\frac{(-1 + \theta)^2 t}{6\theta}$$

$$\frac{1\theta^2 - 2 \cdot 1 \cdot \theta + 1}{6\theta} - \frac{0\theta^2 - 2 \cdot 0 \cdot \theta + 0}{6\theta}$$

$$\frac{\theta^2 - 2\theta + 1}{6\theta} = \frac{(-1 + \theta)^2}{6\theta}$$

- Untuk  $\int_0^1 -\frac{(\theta^2 - 2\theta + 1)(-1 + \theta)}{\theta(6 - 6\theta + 6\theta t)} dt$

$$\int C f(t) dt = C \left( \int f(t) dt \right)$$

$$\frac{-(\theta^2 - 2\theta + 1)(-1 + \theta) \int_0^1 \frac{1}{(6 - 6\theta + 6\theta t)} dt}{\theta}$$



## Lanjutan

## Lampiran 4. Estimasi Parameter Copula Ali-Mikhail-Haq dengan Korelasi Kendall's Tau

$$\text{Selesaikan } \int_0^1 \frac{1}{(6-6\theta+6\theta t)} dt$$

Misalkan

$$u = 6 - 6\theta + 6\theta t$$

$$du = 6\theta dt$$

$$t = \frac{6\theta + u - 6}{6\theta}$$

$$dt = \frac{du}{6\theta}$$

$$\int_0^1 \frac{1}{(6-6\theta+6\theta t)} dt = \int_{-6+6}^6 \frac{1}{6u\theta} du$$

$$\frac{1}{6\theta} \int_{-6+6}^6 \frac{1}{u} du$$

$$\frac{\ln 6 - \ln(-6\theta + 6)}{6\theta}$$

Diperoleh :

$$\frac{-(\theta^2 - 2\theta + 1)(-1 + \theta) \ln 6 - \ln(-6\theta + 6)}{6\theta}$$

Sehingga :

$$= \frac{1}{-1 + \theta} \left( \left( \lim_{t \rightarrow 0^+} \ln \left( \frac{1 - \theta + \theta t}{t} \right) \left( \frac{\theta t^3}{3} + \frac{(1 - \theta)t^2}{2} \right) \right) + \frac{1}{6} - \frac{\theta}{6} + \frac{(-1 + \theta)^2}{6\theta} \right. \\ \left. + \frac{(\theta^2 - 2\theta + 1)(-1 + \theta)(\ln(6) - \ln(-6\theta + 6))}{6\theta^2} \right)$$

Substitusi ke

$$\tau = 1 + 4 \int_0^1 \frac{\ln \left( \frac{1 - \theta + \theta t}{t} \right) t(1 - \theta(1 - t))}{-1 + \theta} dt$$

**Lanjutan**

**Lampiran 4.** Estimasi Parameter Copula Ali-Mikhail-Haq dengan Korelasi Kendall's Tau

$$= 1 + 4 \frac{1}{-1 + \theta} \left( \lim_{t \rightarrow 0^+} \ln \left( \frac{1 - \theta + \theta t}{t} \right) \left( \frac{\theta t^3}{3} + \frac{(1 - \theta)t^3}{2} \right) + \frac{1}{6} - \frac{\theta}{6} + \frac{(-1 + \theta)^2}{6\theta} + \frac{(\theta^2 - 2\theta + 1)(-1 + \theta)(\ln(6) - \ln(-6\theta + 6))}{6\theta^2} \right)$$

- Untuk  $\lim_{t \rightarrow 0^+} \ln \left( \frac{1 - \theta + \theta t}{t} \right) \left( \frac{\theta t^3}{3} + \frac{(1 - \theta)t^3}{2} \right)$

$$\lim_{t \rightarrow 0^+} \ln \left( \frac{1 - \theta + \theta t}{t} \right) \left( \frac{\theta t^3}{3} + \frac{(1 - \theta)t^3}{2} \right)$$

$$\lim_{t \rightarrow a} \frac{f(t)}{g(t)} = \frac{\lim_{t \rightarrow a} f(t)}{\lim_{t \rightarrow a} g(t)}$$

$$f(t) = \ln \left( \frac{1 - \theta + \theta t}{t} \right)$$

$$g(t) = \frac{1}{\frac{\theta t^3}{3} + \frac{(1 - \theta)t^3}{2}}$$

$$\frac{\lim_{t \rightarrow 0^+} \left( \ln \left( \frac{1 - \theta + \theta t}{t} \right) t^3 (-\theta + 3) \right)}{\lim_{t \rightarrow 0^+} 6}$$

$$\frac{(-\theta + 3) \left( \lim_{t \rightarrow 0^+} \ln \left( \frac{1 - \theta + \theta t}{t} \right) t^3 \right)}{6}$$

$$\frac{1}{6} (-\theta + 3) \left( \lim_{t \rightarrow 0^+} \left( -\frac{(-1 + \theta)t^3}{3(\theta t - \theta + 1)} \right) \right)$$

$$\frac{(-\theta + 3) \left( \frac{1}{3} - \frac{\theta}{3} \right) \left( \lim_{t \rightarrow 0^+} \frac{t^3}{\theta t - \theta + 1} \right)}{6}$$

$$\frac{(-\theta + 3) \left( \frac{1}{3} - \frac{\theta}{3} \right) \left( \lim_{t \rightarrow 0} t^3 \right)}{6 \left( \lim_{t \rightarrow 0^+} \theta t - \theta + 1 \right)}$$

$$\frac{1}{6} (-\theta + 3) \left( \frac{1}{3} - \frac{\theta}{3} \right) \left( \lim_{t \rightarrow 0} t^3 \right) \frac{1}{\left( \lim_{t \rightarrow 0^+} \theta t \right) + \left( \lim_{t \rightarrow 0^+} -\theta \right) + \left( \lim_{t \rightarrow 0^+} 1 \right)}$$

**Lanjutan**

**Lampiran 4.** Estimasi Parameter Copula Ali-Mikhail-Haq dengan Korelasi Kendall's Tau

$$\frac{1}{6}(-\theta + 3) \left(\frac{1}{3} - \frac{\theta}{3}\right) \left(\lim_{t \rightarrow 0^+} t^3\right) \frac{1}{\left(\lim_{t \rightarrow 0^+} \theta t\right) - \theta + 1}$$

$$\frac{1}{6}(-\theta + 3) \left(\frac{1}{3} - \frac{\theta}{3}\right) \left(\lim_{t \rightarrow 0^+} t^3\right) \frac{1}{\theta \left(\lim_{t \rightarrow 0^+} t\right) - \theta + 1}$$

$$\lim_{t \rightarrow a} t = a$$

$$\frac{1}{6}(-\theta + 3) \left(\frac{1}{3} - \frac{\theta}{3}\right) \left(\lim_{t \rightarrow 0^+} t^3\right) \frac{1}{-\theta + 1}$$

$$\lim_{t \rightarrow a} t^n = \left(\lim_{t \rightarrow a} t\right)^n$$

$$\frac{1}{6}(-\theta + 3) \left(\frac{1}{3} - \frac{\theta}{3}\right) \left(\lim_{t \rightarrow 0^+} t\right)^3 \frac{1}{-\theta + 1}$$

$$\lim_{t \rightarrow a} t = a$$

$$\frac{1}{6}(-\theta + 3) \left(\frac{1}{3} - \frac{\theta}{3}\right) 0 \frac{1}{-\theta + 1}$$

0

Sehingga :

$$\begin{aligned} \tau &= 1 + 4 \frac{1}{-1 + \theta} \left( \frac{1}{6} - \frac{\theta}{6} + \frac{(-1 + \theta)^2}{6\theta} + \frac{(\theta^2 - 2\theta + 1)(-1 + \theta)(\ln(6) - \ln(-6\theta + 6))}{6\theta^2} \right) \\ &= 1 + 4 \frac{1}{-1 + \theta} \left( \frac{\theta(1 - \theta) + (-1 + \theta)^2}{6\theta} + \frac{(\theta^2 - 2\theta + 1)(-1 + \theta)(\ln(6) - \ln(-6\theta + 6))}{6\theta^2} \right) \\ &= 1 + 4 \frac{1}{-1 + \theta} \left( \frac{\theta(1 - \theta) + (\theta^2 - 2\theta + 1)(-1 + \theta)(\ln(6) - \ln(-6\theta + 6))}{6\theta^2} \right) \\ &= 1 + \frac{4}{-1 + \theta} \left( \frac{\theta(1 - \theta) + (\theta^2 - 2\theta + 1)(-1 + \theta)(\ln(6) - \ln(-6\theta + 6))}{6\theta^2} \right) \\ &= 1 + \left( \frac{2(\theta(1 - \theta) + (\theta^2 - 2\theta + 1)(-1 + \theta)(\ln(6) - \ln(-6\theta + 6)))}{3(-1 + \theta)\theta^2} \right) \end{aligned}$$

**Lampiran 5.** Output Estimasi Parameter Copula Ali-Mikhail-Haq

```
> library(copula)
> data<-read_excel("C:/Users/tosiba/Documents/Data1.xlsx")
> data
> pseudo<-apply(data[,1:3],2,rank)/(nrow(data)+1)
> Up1=cbind(pseudo[,1],pseudo[,2])
> amh.cop1<-amhCopula(dim=2)
> fitAMH1<-fitCopula(amh.cop1,Up1,method="itau")
> fitAMH1
Call: fitCopula(copula, data = data, method = "itau")
Fit based on "inversion of Kendall's tau" and 257 2-dimensional o
bservations.
Copula: amhCopula
  alpha
0.3662
```

Lampiran 6. Data Simulasi Copula Ali-Mikhail-Haq

No	$u$	$v$	No	$u$	$v$
1	0.06213	0.94316	36	0.59333	0.46430
2	0.80417	0.58609	37	0.90330	0.25678
3	0.13605	0.17959	38	0.29691	0.83105
4	0.70217	0.38261	39	0.36230	0.44847
5	0.47180	0.92220	40	0.17647	0.31004
6	0.10761	0.34072	41	0.47661	0.30524
7	0.98375	0.84304	42	0.56774	0.93821
8	0.23811	0.05931	43	0.32350	0.73088
9	0.65347	0.56162	44	0.25077	0.62409
10	0.99322	0.57218	45	0.62202	0.82682
11	0.39050	0.48626	46	0.43558	0.29019
12	0.15317	0.15130	47	0.35240	0.34180
13	0.77603	0.91237	48	0.41192	0.89331
14	0.93024	0.26460	49	0.36661	0.35456
15	0.49220	0.28647	50	0.82806	0.87148
16	0.14150	0.53111	51	0.32039	0.40323
17	0.73041	0.46400	52	0.00599	0.74809
18	0.00916	0.54662	53	0.07671	0.23068
19	0.89298	0.79368	54	0.06782	0.94219
20	0.60381	0.39726	55	0.56199	0.18108
21	0.56329	0.67168	56	0.62344	0.80641
22	0.50496	0.42682	57	0.71798	0.15412
23	0.56059	0.73510	58	0.83749	0.56616
24	0.06975	0.50273	59	0.70707	0.16087
25	0.43370	0.04053	60	0.67208	0.01573
26	0.46127	0.91025	61	0.28725	0.32799
27	0.31957	0.67877	62	0.19850	0.15619
28	0.92551	0.06346	63	0.37103	0.91084
29	0.58039	0.93545	64	0.89950	0.90950
30	0.45261	0.02357	65	0.58335	0.59630
31	0.85033	0.25196	66	0.91873	0.67724
32	0.14733	0.85202	67	0.83095	0.58558
33	0.67604	0.33042	68	0.13176	0.21620
34	0.36486	0.32542	:	:	:
35	0.42727	0.34445	1000	0.69726	0.13525

**Lampiran 7.** Hasil Estimasi VaR 90%

No	Run 1	Run 2	Run 3	Run 4	Run 5
1	-0.03620	-0.03598	-0.03620	-0.03598	-0.03704
2	-0.03357	-0.03465	-0.03357	-0.03465	-0.03412
3	-0.03681	-0.03588	-0.03681	-0.03588	-0.03892
4	-0.03643	-0.03663	-0.03643	-0.03663	-0.03630
5	-0.03498	-0.03283	-0.03498	-0.03283	-0.03641
6	-0.03526	-0.03456	-0.03526	-0.03456	-0.03699
7	-0.03477	-0.03719	-0.03477	-0.03719	-0.03702
8	-0.03518	-0.03396	-0.03518	-0.03396	-0.03465
9	-0.03467	-0.03633	-0.03467	-0.03633	-0.03300
10	-0.03609	-0.03466	-0.03609	-0.03466	-0.03655
11	-0.03513	-0.03679	-0.03513	-0.03679	-0.03459
12	-0.03511	-0.03553	-0.03511	-0.03553	-0.03274
13	-0.03665	-0.03494	-0.03665	-0.03494	-0.03677
14	-0.03920	-0.03742	-0.03920	-0.03742	-0.03769
15	-0.03165	-0.03593	-0.03165	-0.03593	-0.03458
16	-0.03546	-0.03441	-0.03546	-0.03441	-0.03664
17	-0.03699	-0.03712	-0.03699	-0.03712	-0.03733
18	-0.03555	-0.03557	-0.03555	-0.03557	-0.03854
19	-0.03678	-0.03535	-0.03678	-0.03535	-0.03757
20	-0.03702	-0.03406	-0.03702	-0.03406	-0.03352
21	-0.03506	-0.03683	-0.03506	-0.03683	-0.03444
22	-0.03466	-0.03527	-0.03466	-0.03527	-0.03832
23	-0.03677	-0.03706	-0.03677	-0.03706	-0.03560
24	-0.03417	-0.03828	-0.03417	-0.03828	-0.03661
25	-0.03436	-0.03853	-0.03436	-0.03853	-0.03455
26	-0.03687	-0.03684	-0.03687	-0.03684	-0.03253
27	-0.03450	-0.03544	-0.03450	-0.03544	-0.03903
28	-0.03567	-0.03679	-0.03567	-0.03679	-0.03709
29	-0.03449	-0.03517	-0.03449	-0.03517	-0.03524
30	-0.03940	-0.03509	-0.03940	-0.03509	-0.03740
31	-0.03352	-0.03706	-0.03352	-0.03706	-0.03697
32	-0.03790	-0.03834	-0.03790	-0.03834	-0.03685
33	-0.03756	-0.03533	-0.03756	-0.03533	-0.03544
34	-0.03934	-0.04086	-0.03934	-0.04086	-0.03682
35	-0.03694	-0.03875	-0.03694	-0.03875	-0.04117

**Lanjutan****Lampiran 7.** Hasil Estimasi VaR 90%

No	Run 1	Run 2	Run 3	Run 4	Run 5
36	-0.03715	-0.03846	-0.03715	-0.03846	-0.03695
37	-0.03635	-0.03894	-0.03635	-0.03894	-0.03747
38	-0.03780	-0.03843	-0.03780	-0.03843	-0.03744
39	-0.04032	-0.04068	-0.04032	-0.04068	-0.03884
40	-0.03944	-0.03711	-0.03944	-0.03711	-0.03707

**Lampiran 8.** Hasil Estimasi VaR 95%

No.	Run 1	Run 2	Run 3	Run 4	Run 5
1	-0.05152	-0.04933	-0.05152	-0.04933	-0.04845
2	-0.04744	-0.04828	-0.04744	-0.04828	-0.04509
3	-0.05335	-0.04822	-0.05335	-0.04822	-0.04912
4	-0.04550	-0.04725	-0.04550	-0.04725	-0.04674
5	-0.04740	-0.04261	-0.04740	-0.04261	-0.05144
6	-0.04833	-0.04510	-0.04833	-0.04510	-0.05090
7	-0.04595	-0.05280	-0.04595	-0.05280	-0.05262
8	-0.04582	-0.04780	-0.04582	-0.04780	-0.05203
9	-0.04968	-0.05000	-0.04968	-0.05000	-0.04412
10	-0.05088	-0.05157	-0.05088	-0.05157	-0.05007
11	-0.04645	-0.05453	-0.04645	-0.05453	-0.04506
12	-0.04604	-0.04782	-0.04604	-0.04782	-0.04485
13	-0.04580	-0.05057	-0.04580	-0.05057	-0.05488
14	-0.05410	-0.05141	-0.05410	-0.05141	-0.05224
15	-0.04366	-0.04719	-0.04366	-0.04719	-0.04696
16	-0.04801	-0.04548	-0.04801	-0.04548	-0.05136
17	-0.04678	-0.04910	-0.04678	-0.04910	-0.05023
18	-0.04666	-0.05498	-0.04666	-0.05498	-0.05883
19	-0.05405	-0.04855	-0.05405	-0.04855	-0.05549
20	-0.05344	-0.04816	-0.05344	-0.04816	-0.04392
21	-0.04839	-0.04678	-0.04839	-0.04678	-0.04225
22	-0.05016	-0.04757	-0.05016	-0.04757	-0.04895
23	-0.05025	-0.05274	-0.05025	-0.05274	-0.04854
24	-0.04601	-0.04960	-0.04601	-0.04960	-0.04991
25	-0.04957	-0.05013	-0.04957	-0.05013	-0.04778
26	-0.04844	-0.04949	-0.04844	-0.04949	-0.04901
27	-0.04888	-0.05052	-0.04888	-0.05052	-0.05310
28	-0.05209	-0.04607	-0.05209	-0.04607	-0.04987
29	-0.04731	-0.04678	-0.04731	-0.04678	-0.04715
30	-0.05131	-0.04809	-0.05131	-0.04809	-0.05239
31	-0.04408	-0.05303	-0.04408	-0.05303	-0.05008
32	-0.05134	-0.05042	-0.05134	-0.05042	-0.04779
33	-0.04861	-0.05168	-0.04861	-0.05168	-0.05098
34	-0.05091	-0.05466	-0.05091	-0.05466	-0.05035
35	-0.04936	-0.05290	-0.04936	-0.05290	-0.05453



**Lanjutan**

**Lampiran 8. Estimasi VaR 95%**

No	Run 1	Run 2	Run 3	Run 4	Run 5
36	-0.05189	-0.05037	-0.05189	-0.05037	-0.05028
37	-0.04997	-0.05083	-0.04997	-0.05083	-0.05228
38	-0.05525	-0.05070	-0.05525	-0.05070	-0.05014
39	-0.05890	-0.05613	-0.05890	-0.05613	-0.05814
40	-0.05389	-0.05127	-0.05389	-0.05127	-0.05419

**Lampiran 9.** Hasil Estimasi VaR 99%

No	Run 1	Run 2	Run 3	Run 4	Run 5
1	-0.10397	-0.09990	-0.10397	-0.09990	-0.08227
2	-0.08649	-0.08832	-0.08649	-0.08832	-0.09250
3	-0.10710	-0.09572	-0.10710	-0.09572	-0.08460
4	-0.07185	-0.10100	-0.07185	-0.10100	-0.09402
5	-0.08691	-0.07758	-0.08691	-0.07758	-0.11157
6	-0.09302	-0.08425	-0.09302	-0.08425	-0.08566
7	-0.08746	-0.10216	-0.08746	-0.10216	-0.10292
8	-0.10201	-0.08185	-0.10201	-0.08185	-0.09037
9	-0.08468	-0.11008	-0.08468	-0.11008	-0.09076
10	-0.09674	-0.09975	-0.09674	-0.09975	-0.09405
11	-0.08752	-0.09141	-0.08752	-0.09141	-0.08775
12	-0.08669	-0.08609	-0.08669	-0.08609	-0.08865
13	-0.10091	-0.08241	-0.10091	-0.08241	-0.08496
14	-0.08669	-0.08443	-0.08669	-0.08443	-0.09308
15	-0.07920	-0.10700	-0.07920	-0.10700	-0.08573
16	-0.08339	-0.08109	-0.08339	-0.08109	-0.10587
17	-0.07888	-0.09680	-0.07888	-0.09680	-0.08317
18	-0.09075	-0.11129	-0.09075	-0.11129	-0.10335
19	-0.10481	-0.10543	-0.10481	-0.10543	-0.11381
20	-0.10113	-0.07683	-0.10113	-0.07683	-0.09839
21	-0.10803	-0.07788	-0.10803	-0.07788	-0.06894
22	-0.08600	-0.08864	-0.08600	-0.08864	-0.09033
23	-0.08821	-0.08829	-0.08821	-0.08829	-0.08684
24	-0.08560	-0.09420	-0.08560	-0.09420	-0.07753
25	-0.10014	-0.08980	-0.10014	-0.08980	-0.09127
26	-0.10042	-0.08894	-0.10042	-0.08894	-0.08932
27	-0.08969	-0.09618	-0.08969	-0.09618	-0.08501
28	-0.09570	-0.09264	-0.09570	-0.09264	-0.09839
29	-0.08259	-0.08759	-0.08259	-0.08759	-0.08554
30	-0.07962	-0.08928	-0.07962	-0.08928	-0.09627
31	-0.07945	-0.09997	-0.07945	-0.09997	-0.08855
32	-0.08832	-0.08052	-0.08832	-0.08052	-0.10198
33	-0.09491	-0.10615	-0.09491	-0.10615	-0.08905
34	-0.09122	-0.08829	-0.09122	-0.08829	-0.08865
35	-0.10379	-0.09496	-0.10379	-0.09496	-0.11181

Lanjutan

**Lampiran 9. Hasil Estimasi VaR 99%**

No	Run 1	Run 2	Run 3	Run 4	Run 5
36	-0.08661	-0.10341	-0.08661	-0.10341	-0.09135
37	-0.09286	-0.10452	-0.09286	-0.10452	-0.11243
38	-0.08506	-0.09014	-0.08506	-0.09014	-0.08434
39	-0.09393	-0.10252	-0.09393	-0.10252	-0.10325
40	-0.09813	-0.09532	-0.09813	-0.09532	-0.08407

**Lampiran 10. Hasil Estimasi CVaR**

Tingkat Kepercayaan	Run 1	Run 2	Run 3	Run 4	Run 5	Rata-Rata
90%	-0.0381	-0.0372	-0.0375	-0.0375	-0.0378	-0.0376
95%	-0.0547	-0.0532	-0.0529	-0.0539	-0.0542	-0.0538
99%	-0.1087	-0.1056	-0.1086	-0.1107	-0.1131	-0.1093