EE 435 Assignment 1

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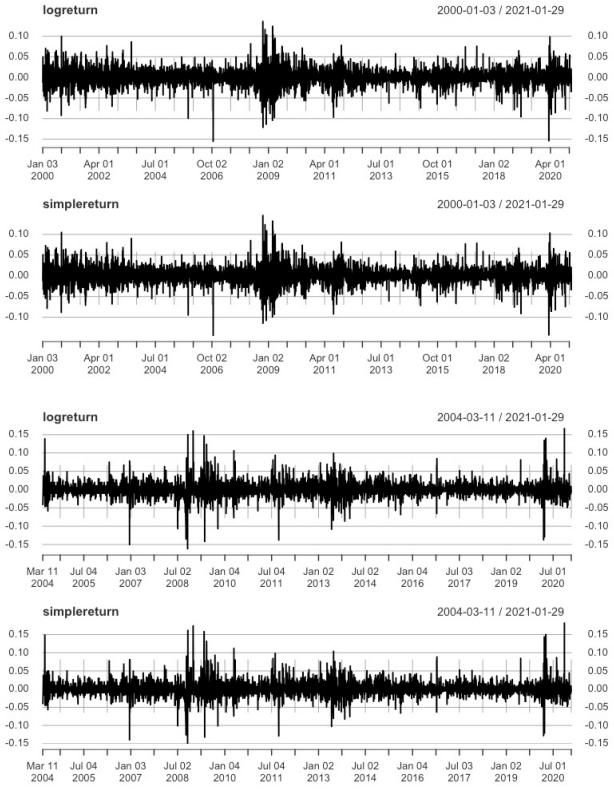
a. Log return and simple return for CAT and AOT.BK respectively.



b.

```
> table.Stats(simplereturn)
```

	CAT.Adjusted
Observations	5302.0000
NAs	1.0000
Minimum	-0.1452
Quartile 1	-0.0095
Median	0.0005
Arithmetic Mean	0.0007
Geometric Mean	0.0005
Quartile 3	0.0110
Maximum	0.1472
SE Mean	0.0003
LCL Mean (0.95)	0.0001
UCL Mean (0.95)	0.0013
Variance	0.0004
Stdev	0.0205
Skewness	0.0197
Kurtosis	4.5480

```
> table.Stats(simplereturn)
```

	AOT.BK.Adjusted
Observations	4158.0000
NAs	1.0000
Minimum	-0.1505
Quartile 1	-0.0093
Median	0.0000
Arithmetic Mean	0.0010
Geometric Mean	0.0007
Quartile 3	0.0103
Maximum	0.1834
SE Mean	0.0003
LCL Mean (0.95)	0.0003
UCL Mean (0.95)	0.0016
Variance	0.0005
Stdev	0.0213
Skewness	0.5443
Kurtosis	10.0827

c. JB test is used to perform the normality test of the data. In this case, p-value is less than the alpha at 0.05 which we can interpret that the simple return of the CAT is not normally distributed and 95% CI.

```
        Jarque Bera Test

data:  newlogreturn
X-squared = 4906.1, df = 2, p-value < 2.2e-16
```

d. For CAT sample mean= 0.05%. S.D.=0.0205. Skewness=-0.1836. Excess kurtosis=4.6982. Max=13.73%. Min= -15.69%

For AOT.BK sample mean= 0.07%. S.D.=0.0212. Skewness=0.1746. Excess kurtosis=9.6096. Max=16.84%. Min= -16.32%

```
> table.Stats(logreturn)
                  CAT.Adjusted
Observations        5302.0000
NAs                    1.0000
Minimum               -0.1569
Quartile 1            -0.0095
Median                 0.0005
Arithmetic Mean        0.0005
Geometric Mean         0.0003
Quartile 3             0.0110
Maximum                0.1373
SE Mean                0.0003
LCL Mean (0.95)       -0.0001
UCL Mean (0.95)        0.0010
Variance               0.0004
Stdev                  0.0205
Skewness              -0.1836
Kurtosis               4.6982
>
```

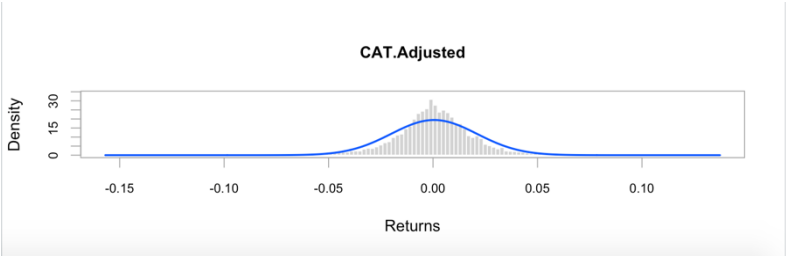
```
> table.Stats(logreturn)
                  AOT.BK.Adjusted
Observations           4158.0000
NAs                       1.0000
Minimum                  -0.1632
Quartile 1               -0.0093
Median                    0.0000
Arithmetic Mean           0.0007
Geometric Mean            0.0005
Quartile 3                0.0102
Maximum                   0.1684
SE Mean                   0.0003
LCL Mean (0.95)           0.0001
UCL Mean (0.95)           0.0014
Variance                  0.0004
Stdev                     0.0212
Skewness                  0.1746
Kurtosis                  9.6096
>
```

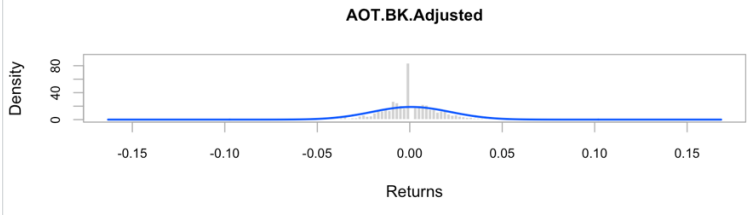
e. Based on the calculation on the R program, the result of CAT and AOT.BK is located below respectively. For CAT, the p-value is 0.08377 which is greater than the alpha at 0.05 which mean that the we cannot reject the null hypothesis at 95% CI and mean of the log return is zero. For AOT.BK, the p-value is less than alpha at 0.05 which mean that we reject the null hypothesis at 95% CI and conclude that mean of log return is not equal to zero.

```
        One Sample t-test

data:  newlogreturn
t = 1.7296, df = 5301, p-value = 0.08377
alternative hypothesis: true mean is not equal to 0
95 percent confidence interval:
 -6.513168e-05  1.041069e-03
sample estimates:
   mean of x
0.0004879685
```

```
> #Test mean = 0
> t.test(newlogreturn)

        One Sample t-test

data:  newlogreturn
t = 2.2696, df = 4157, p-value = 0.02328
alternative hypothesis: true mean is not equal to 0
95 percent confidence interval:
 0.0001016629 0.0013915769
sample estimates:
   mean of x
0.0007466199
```

f.





g. 95% confidence interval for the daily log return of CAT is (-6.513168e^-5 , 1.041069e^-3).

h. CAT, since the p-value is less than the alpha at 0.05 which mean that we reject the null hypothesis at 95% CI and means that the skewness of the return of CAT is not equal to zero.

AOT.BK, since the p-value is less than the alpha at 0.05 which mean that we reject the null hypothesis at 95% CI and means that the skewness of the return of AOT.BK is also not equal to zero.

```
> #5 Test Skewness = 0
> T=length(newlogreturn)
> s3=skewness(newlogreturn)
> tst = s3/sqrt(6/T)
> tst
[1] -5.458812
> pv = 2*pnorm(tst)
> pv
[1] 4.793299e-08
>
```

```
> #5 Test Skewness = 0
> T=length(newlogreturn)
> s3=skewness(newlogreturn)
> tst = s3/sqrt(6/T)
> tst
[1] 4.596526
> pv = 2*(1-pnorm(tst))
> pv
[1] 4.29594e-06
>
```

i. Since the p-value of both CAT and AOT.BK are less than the alpha at 0.05 which mean that we reject the null hypothesis at 95% CI and means that the excess kurtosis is not equal to zero or the kurtosis of both stocks are not equal to 3.

```
> #6 Test excess kurtosis = 0
> k4=kurtosis(newlogreturn)
> tst=k4/sqrt(24/T)
> tst
[1] 69.83078
> pv = 2*(1-pnorm(tst))
> pv
[1] 0
```

```
> #6 Test excess kurtosis = 0
> k4=kurtosis(newlogreturn)
> tst = k4/sqrt(24/T)
> tst
[1] 126.4855
> pv = 2*(1-pnorm(tst))
> pv
[1] 0
>
```