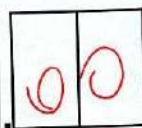
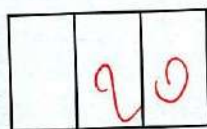


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Promo 2018
Date 28/3/17



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M1 - 2016

MATIÈRE Statistics for Finance 2

Part 1: Defining a Financial Asset Return:

1 - $R_t = \frac{P_t}{P_{t-1}} - 1$

2 - The adjusted closed prices take into account the histories of the equity, it integrates the past information so it's preferable to choose it than the closing price.

3 - $r_t = \log\left(\frac{P_t}{P_{t-1}}\right) = \log(R_t + 1)$

4 - Which R commands would I use:

a - `setwd("c:/desktop") ; attach("beeing.csv")`
`read.csv("beeing")`

`prices <- beeing ~ Adj. Close`
`plot(prices)`

b - In regard of this graphic we can say that, the stock prices could be exponentially distributed.

c - I think the log return function has similarities with the graphic of stock prices, but shows more informations, more variance from one periode to another but still follow exponentially distribution.

d. $rt = \log(R_t + 1)$. The compound return is like the simple return but follow logarithmic walk. So it's normal that the two graphs look like.

Part 2 Statistical Properties of Returns: $\frac{0.41}{5}$

1 - Descriptive Statistics: The company that we want

a. summary(Company) // boxplot(Company)
min, max, median, Q_1 , Q_3

skewness(Company); kurtosis(Company) - 3

Var(Company), sd(Company), mean(Company)

b - Based on these results, ~~and that~~ ^{Intel} would be the more performant followed by Wal Mart because they have the highest standard deviation and the highest mean.

If we calcul their performance:

$\mu \times \sigma^2$ we find the highest value.

* The less risky one is ^{The Dow Jones} ~~General Motors~~ which has the smallest variance. It's followed by General Motors.

c - The best return if I invest a boeing stock will be 41% but I can lose more, 42% in the worst case.

1 - The skewness measure the asymmetry of the distribution ~~too~~ around the mean. It's negative when it's skew to the left and positive otherwise. ~~The Kurtosis is the same but it's measure the amplitude, if it's high (positive) it's a leptokurtic and if it's low (negative) platykurtic. In a normal distribution we have skewness equal to 0 and Kurtosis equal to 3.~~

For the Citigroup we have a negative skewness, it's skew to the left. It's the case in the financial market. And it has an Excess kurtosis of 3.59 $\approx$ to kurtosis of 6.59. That's mean the highest volatilities are followed by the quiet variations.

* I can't confirm that Citigroup stock return are normally distributed. Maybe GM are.

Part 3 Testing for Normality

2 - Histogram

a - Hist (Citigroup log returns)

b - Based on the histogram we can say that we have a negative skewness, positive kurtosis ~~but~~ distribution looks normal.

3 - Q-Q plot

c - the Q-Q plot represent quantiles ~~match~~ matches. When an observe quantile match with a normal distributed quantile

we plot a point. There the plotted points fit the diagonal more the observed values are normally distributed.

d - To test the normality based on Q-Q plot method:

✓ `qqnorm(citi group log returns);`
`qqline(citi group log returns);`

e - lot of points fit the diagonal. We can say that citi group log returns seems normally distributed.

4 - Statistical Tests of Normality

f - Jarque Bera test examines the normality of a variable X by calculating its skewness and kurtosis. If ~~the~~ the skewness and the excess kurtosis are near to 0, then Jarque Bera test is near to 0, that mean X are normally distributed otherwise if the JBT are high we reject the normality hypothesis.

g - How to implement this test in R:

Package: `normtest`

Command: `jarque.test(log returns)`

`jarque.test(Rt)`

h - The principle of a Kolmogorov Smirnov test is to measure the gap between two cumulative distribution functions or between a cumulative distribution function of observed values and a cdf of a normally distributed values.

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1- to implement this in R :

Packages :

Commands : $KS.test(R_t)$;

2- H_0 : log Returns are normally distributed

H_1 : log Returns are not normally distributed.

3- If $Jarque-test(R_t) \gg 0$ we reject the null hypothesis.

4- These tests show us that Boeing isn't normally distributed. The Jarque-Bera test is too high and the p-value very small. It's the same for Shapiro and Kolmogorov-test, the value of p is very small in every test, it's small than all the α (0,05, 0,10) we use to take for normality test. So even if the JB test was close to 0 we would reject the null hypothesis because of the p-value.

