

Computational Finance

Series 1

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Computing Returns

The following series' monthly return was calculated:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
101	102	103	104	105	106	107	108	109	110	111	112

Table 1: The months and their appropriate values.

1. Compute the Monthly Returns

Jan	Feb	Mar
0.010000000	0.009900990	0.009803922
Apr	May	Jun
0.009708738	0.009615385	0.009523810
Jul	Aug	Sep
0.009433962	0.009345794	0.009259259
Oct	Nov	Dec
0.009174312	0.009090909	0.009009009

Table 2: The months and their appropriate returns.

2. Compute the Annual Returns from the Monthly Returns

Annual Return from Monthly:

- 0.12

Compared to the sums of the Monthly:

- 0.1138661

As noted, 12% (0.12) is the correct value, and is calculated according to the formula implemented in the code, as opposed to summing the values from the monthly returns, which would not yield the correct value.

3. Calculate the average monthly return and the average of the monthly returns!

Average monthly return is:

Jan	Feb	Mar
0.08333333	0.16666667	0.25000000
Apr	May	Jun
0.33333333	0.41666667	0.50000000
Jul	Aug	Sep
0.58333333	0.66666667	0.75000000
Oct	Nov	Dec
0.83333333	0.91666667	1.00000000

Table 3: Average Monthly Return

Average of the monthly returns is:

- 0.00875893

Portfolio of Microsoft and Starbucks stock

1. Compute the initial value of the portfolio

Since there is not a return to consider, the initial value of the portfolio will be the capital invested in the portfolio, which will be: $* 10(\$85) + 10(\$30) = \$1150$

2. Compute the portfolio shares

- Since you bought 10 shares each, that would be 10/20 and 10/20
- $A_{msft} = 0.5$
- $A_{sbux} = 0.5$

3. Compute the one-period return of Microsoft and Starbucks stocks

- Microsoft one-period return: $90-85/85 = 0.05882353$
- Starbucks one-period return: $28-30/30 = 0.06666667$

4. Compute the return of the portfolio and its value at end of month t

- Value of the portfolio given by $1150(1+0.5*0.05882353+0.5*0.06666667) = \1222.157 at the end of month t.
- Return of the portfolio given by $(1222.157-1150)/1150 = 0.06274522$

Two Random Variables

1. The $E[X]$ is the expected value of X:

0.283008

2. $E[X|Y = 0]$ is the expected value of X or the most likely value X can take, given that Y is equal to 0.

- 0.3

3. $\text{Var}[X|Y = 0]$ is

- 0.01666667

Wiki-Culture

Stock: in general, a stock is a share of ownership in a company. It usually indicates the fraction of earnings that the stockholder (owner of the stock) is entitled to. There are different types of stocks, some of which may or may not have different privileges related to the company, such as voting rights.

Bond: a form of a loan/IOU, where the issuer of the bond is the borrower, and the holder of the bond is the lender. Bonds usually have some sort of interest attached, and it specifies that at a later date, when the bond is paid back, how much additional value will be added on top of the original.