

ECON 424/CFRM 462 Lab 1

Summer 2015

Due: Tuesday, June 30 at 8pm via Canvas

Part I: Return calculations

Consider the following (actual) monthly adjusted closing price data for Starbucks stock over the period December 2004 through December 2005

End of Month Price Data for Starbucks Stock	
December, 2004	\$31.18
January, 2005	\$27.00
February, 2005	\$25.91
March, 2005	\$25.83
April, 2005	\$24.76
May, 2005	\$27.40
June, 2005	\$25.83
July, 2005	\$26.27
August, 2005	\$24.51
September, 2005	\$25.05
October, 2005	\$28.28
November, 2005	\$30.45
December, 2005	\$30.51

1. Using the data in the table, what is the simple monthly return between the end of December, 2004 and the end of January 2005? If you invested \$10,000 in Starbucks at the end of December 2004, how much would the investment be worth at the end of January 2005?
2. Using the data in the table, what is the continuously compounded monthly return between December, 2004 and January 2005? Convert

this continuously compounded return to a simple return (you should get the same answer as in part a).

3. Assuming that the simple monthly return you computed in part (1) is the same for 12 months, what is the annual return with monthly compounding?
4. Assuming that the continuously compounded monthly return you computed in part (2) is the same for 12 months, what is the continuously compounded annual return?
5. Using the data in the table, compute the actual simple annual return between December 2004 and December 2005. If you invested \$10,000 in Starbucks at the end of December 2004, how much would the investment be worth at the end of December 2005? Compare with your result in part (3).
6. Using the data in the table, compute the actual annual continuously compounded return between December 2004 and December 2005. Compare with your result in part (4). Convert this continuously compounded return to a simple return (you should get the same answer as in part 5).

Part II. Excel exercises

Go to <http://finance.yahoo.com> and download monthly data on Starbucks (ticker symbol sbux) over the 15 year period March 1993 to March 2008. See the Homework page on the class website for detailed instructions on how to download data from Yahoo!. Read the data into Excel and make sure to re-order the data so that time runs forward. Do your analysis on the monthly closing price data (which should be adjusted for dividends and stock splits). Name the spreadsheet tab with the data “data”.

1. Make a time plot (line plot in Excel) of the monthly price data over the period (end of March 1993 through (end of) March 2008. Please put informative titles and labels on the graph. Place this graph in a separate tab (spreadsheet) from the data. Name this tab “graphs”. Briefly comment on what you see (e.g. price trends, etc.).
 - (a) If you invested \$1,000 at the end of March 1993, what would your investment be worth at the end of March 2008?

- (b) What is the compound annual rate of return over this period assuming annual compounding? (Hint: what is the geometric average annual rate for the 15 year investment?)
2. Make a time plot of the natural logarithm of monthly price data over the period March 1993 to March 2008 and place it in the “graph” tab. Comment on what you see and compare with the plot of the raw price data.
- (a) Why is a plot of the log of prices informative? (Hint: what is the slope between two time periods?)
3. Using the monthly price data over the period March 1993 to March 2008 in the “data” tab, compute simple monthly returns (Starbucks does not pay a dividend). When computing returns, use the convention that P_t is the end of month closing price. Make a time plot of the monthly returns, place it in the “graphs” tab and comment. Keep in mind that the returns are percent per month and that the annual return on a US T-bill is about 0.5 right now%.
4. Compute simple annual returns for the years 1993 through 2008 (note: there are easy and hard ways to do this). Make a time plot of the annual returns, put them in the “graphs” tab and comment. Note: You may compute annual returns using overlapping data or non-overlapping data. With overlapping data you get a series of annual returns for every month (sounds weird, I know). That is, the first month annual return is from the end of March, 1993 to the end of March, 1994. The second month annual return is from the end of April, 1993 to the end of April, 1994 etc. With non-overlapping data you get a series of 15 annual returns for the 15 year period 1993:March-2008:March. That is, the annual return for 1993:March - 1994:March is computed from the end of March 1993 through the end of March 1994. The second annual return is computed from the end of March 1994 through the end of March 1995 etc.
5. Using the monthly price/return data over the period March 1993 to March 2008, compute continuously compounded (cc) monthly returns and place them in the “data” tab. Make a time plot of the monthly cc returns, put them in the “graphs” tab and comment.

- (a) Briefly compare the continuously compounded returns to the simple returns. Which ones are bigger?
6. Compute continuously compounded annual returns for the years 1993 through 2008 (Again, there are easy and hard ways to do this). Make a time plot of the annual returns and comment. Briefly compare the continuously compounded returns to the simple returns.

Part III. R Exercises

Go to <http://finance.yahoo.com> and download monthly data on Starbucks (ticker symbol sbux) over the period March, 1993 to March, 2008. Load the data into Excel and make sure to reorder the data so that time runs forward. Delete all columns except those containing the dates and the adjusted closing prices. Save the file as a .csv (comma separated value) file and call it `sbuxPrices.csv`. This is important because base R does not have functions for importing data from an Excel spreadsheet (see the `readxl`, `RODBC`, `XLConnect`, and `xlsx` packages for functions to read and write directly to Excel files).

Start R and open the file `econ424lab1.r`. Execute the commands in this file line by line. Copy and paste your output into a Word (or whatever word processor you use) document to show that you have done this assignment.

1. Import the data in the file `sbuxPrices.csv` using the R function `read.csv()` into the data.frame object `sbux.df`. Follow the commands in `econ424lab1.r` to manipulate the data.
2. Plot the closing price data using the `plot()` function. Notice that the dates do not show up on the x-axis in the line plot. We will learn how to fix this in future labs.
3. Compute monthly simple and continuously compounded returns. Plot these returns separately and on the same graph.
4. A relatively new feature to R is the ability to create dynamic JavaScript based graphs that display in a web browser. In particular the R package `dygraphs` (see <https://rstudio.github.io/dygraphs/>) has functions for creating interactive time series graphs similar to those on finance.yahoo.com. If you are using Rstudio then you can view the graph in the Rstudio web viewer. Follow the short example at the

end of the code in `econ424lab1.r` to see how easy it is to create an interactive web graph using **dygraphs** within Rstudio.