Master of Finance Bootcamp 1: Technology

Professor Tucker Balch

tucker.balch@emory.edu

Thanks to Bill McKinnon

Professor Tucker Balch

- Born in Miami.
- Ph.D. in Robotics.
- Prof in AI at Georgia Tech.
- AI Research at J.P. Morgan.
- Now at GBS!

- Wife Maria is a marathon runner and Prof at UGA.
- Sons TC and Gunnar, and daughter Emmy all in college.
- Likes to fish!

Professor Tucker Balch

- *tucker.balch@emory.edu*
- 678-523-8685
- Office: 468, right next to “The Lab”

Here to help with:

- Technology and software
- ISOM 641: Data Visualization for Finance
- FIN 671/672: MF Practicum

Your Computer

- You each have committed to have a reliable ***contemporary Windows computer.***
- If you do not have a reliable contemporary Windows machine, help with assignments may be challenging.
- We will try to help with short-term, limited duration emergencies. If you are not comfortable supporting your own computer, …
  - Follow instructions carefully.
  - Seek assistance early.
  - Be open, honest, and patient.
  - Do not take advantage of the kindness of others.

Files and Directories

- Your hard disk provides relatively permanent storage of files.
- When you open your hard disk using your operating system, it will contain files and folders at the top-most level; this top-most level is referred to as the “root” or “root folder” of the disk.
- Files are saved in folders; folders may contain files or other folders (recursively).
- Folders are named based on what is stored within them. As you open folders inside of folders, we assume that we are “drilling down” into successively more specific groupings of files (and/or folders).
- Folders may contain a program, or a group of files that act together as parts of a program. In other words, programs are not necessarily stored in single files, or even single directories at any given level.

Files and Directories (continued)

- File naming and addressing syntax is determined by your Operating System.
- In Windows, drives are usually identified by a drive letter and a colon (e.g., "`C:`"), with the root directory identified by a backslash (i.e., "\").
- In Windows, directories are denoted by their name followed by a backslash, e.g., "`C:\MyDocuments`", "`C:\MyDocuments\FIN555`" and "`C:\MyDocuments\FIN555\syllabus.pdf`" (absolute locations)
- Alternatively, directories and files may be referenced relative to a given location by using a ".", e.g., " `.\FIN555\syllabus.pdf`" (relative locations)

Programs and Data

- Files might contain programs (instructions that tell the computer what to do), or data (information that may help guide the program).
- Instructions might be in contained in executable files or in different types of libraries; libraries cannot be run directly by a user (like an executable file can), but they contain groups of instructions that can be loaded into memory and run when called upon.
- In other words, programs can start other programs, and can call functions contained in libraries; programs can read and write data files that may/may not be human-readable.
- Your operating system is generally the first program that your computer runs; it is generally started automatically when you turn your computer on

How Does it Know?

- Many computers will associate file extensions of data files with the program intended to act on the data file. In Windows, these relationships are stored in the registry.
- The registry is stored on disk in a data file, so that it's persistent, but it should only be edited using Windows' tools; if it is corrupted, you will have a world of problems.
  - PDF documents generally end in ".pdf"
  - Executable files generally end in ".exe" (".com" files are a bit different, but very similar)
  - Dynamically Linked Librarys may end in ".dll"
  - Computer programs ("source", or human readable, files) written in C end in ".c"
  - Python program source files generally end in ".py"
  - Python notebooks generally end in ".ipynb"
  - Others: .docx, .xlsx, .pptx

AI

"*AI won't replace humans, but humans with AI will replace humans without AI.*"

--Karim Lakhani, Harvard Business School

chatGPT

- Allowable use depends on the instructor and the course. Be sure you understand the policy for THAT course before you use it for an assignment.
- For my courses, OK uses include:
  - Assistance in writing code.
  - Assistance in using applications like excel and PyCharm.
  - Be sure to cite GPT, e.g., “We used GPT to assist in writing code for the graph.”
- Prohibited uses include:
  - Using GPT for writing or drawing conclusions in reports.
- Remember:
  - chatGPT lies. You are responsible for the work you turn in.
  - You may be tested on programming or app usage techniques, so don’t overly rely on GPT.
- Stay tuned, policies may change.

Software You Need: Microsoft Office

- Go to https://email.emory.edu
- Log in with your Emory NETID (e.g., “TBALCH”) and password.
- Click on the “app launcher” upper left (next to Emory logo).
- Click on “Microsoft 365”
- Click on “Install and more” on upper right.
- Click on “Install Microsoft 365 apps”
- Click on “Install Office”
- Click on downloaded file “OfficeSetup.exe”

- Open and log into Excel to make sure it works!

Software You Need: Anaconda

- Go to https://anaconda.com/download
- Click “skip registration”
- Click on the installer appropriate to your machine.
- Click on downloaded file “AnacondaXXX-Windows-x86_64.exe”
- Click “install”

Using Excel

- Likely one of the most powerful tools that you will use at least every week (day?) of your professional life in Finance.
- “Powerful” (like a weapon) → “With great power comes great responsibility”
- Excel can be a glorified calculator, or something close to a dynamic programming environment.
- Many ”Cheat sheets” can be found online.
- ChatGPT can be your online excel handbook!

Let’s Get Some Data!

- Go to https://finance.yahoo.com
- Repeat the following for: SPY, NVDA
  - Type the ticker symbol in the search bar
  - Click “Historical Data”
  - Select a time period over 1 year (1Y)
  - Select “Historical Prices”, and “Daily”
  - Select “Download”
  - Save as a file.

Importing Data

- Excel can import several different formats of files: “xlsx”, “xls”, “csv”, “tsv”, and others.
- Try opening the file that you imported from Yahoo! Finance for SPY.
- You should be able to double-click the file; or right-click it, and select “Open” from the popup menu.
- Alternatively, you can select “File → Import”, and answer the questions on the subsequent modal boxes, to import the file.
- Name the tab “SPY”

What CSV Data Looks Like

Date,Open,High,Low,Close,Adj Close,Volume
2019-08-12,289.959991,291.609985,287.019989,288.070007,266.252930,65527600
2019-08-13,287.739990,294.149994,287.359985,292.549988,270.393616,94299800
2019-08-14,288.070007,288.739990,283.760010,283.899994,262.398804,135622100
2019-08-15,284.880005,285.640015,282.390015,284.649994,263.091949,99556600
2019-08-16,286.480011,289.329987,284.709991,288.850006,266.973938,83018300
2019-08-19,292.190002,293.079987,291.440002,292.329987,270.190308,53571800
2019-08-20,291.769989,292.359985,289.950012,290.089996,268.119904,51596400
2019-08-21,292.480011,292.859985,291.720001,292.450012,270.301208,49524700
2019-08-22,293.230011,293.929993,290.399994,292.359985,270.218048,51666400
2019-08-23,290.920013,292.760010,283.470001,284.850006,263.276764,149161500

Formatting

- Dates
- Numbers
- Currency
- Double click on column boundaries
- Conditional formatting

OHLC Data

- Rows of data. Each row is for one period of time:
  - Date (quiz: how many trading days in a year)
  - Open
  - High
  - Low
  - Close
  - Adjusted Close
  - Volume
- What is “adjusted close”
  - If you buy a stock, what is returned to you in value?
  - Splits and dividends.

Cells Can Compute

- Duplication
- Addition
- Consequence of copying a cell
- How to address the copying issue.

Make a Plot

Plot SPY date versus Adj Close.

Add NVDA.

Plot date, SPY, NVDA.

Normalize/standardize.

Computing Returns

The file “SPY.csv” should have one sheet; its one sheet should have seven columns (A-G): “Date”, “Open”, “High”, “Low”, “Close”, “Adjusted Close”, and “Volume”.

Returns are calculated over a period as

$$(\text{newprice} - \text{oldprice})/(\text{oldprice}) = \text{new/old} - 1.0$$

and are expressed as a percentage.

Computing Returns

In your Excel spreadsheet, select the cell at column I & row 3, and type “=F3/F2-1” ; this is the daily return on SPY stock this day.

Using whatever technique you like, copy that cell for all subsequent rows of column I.

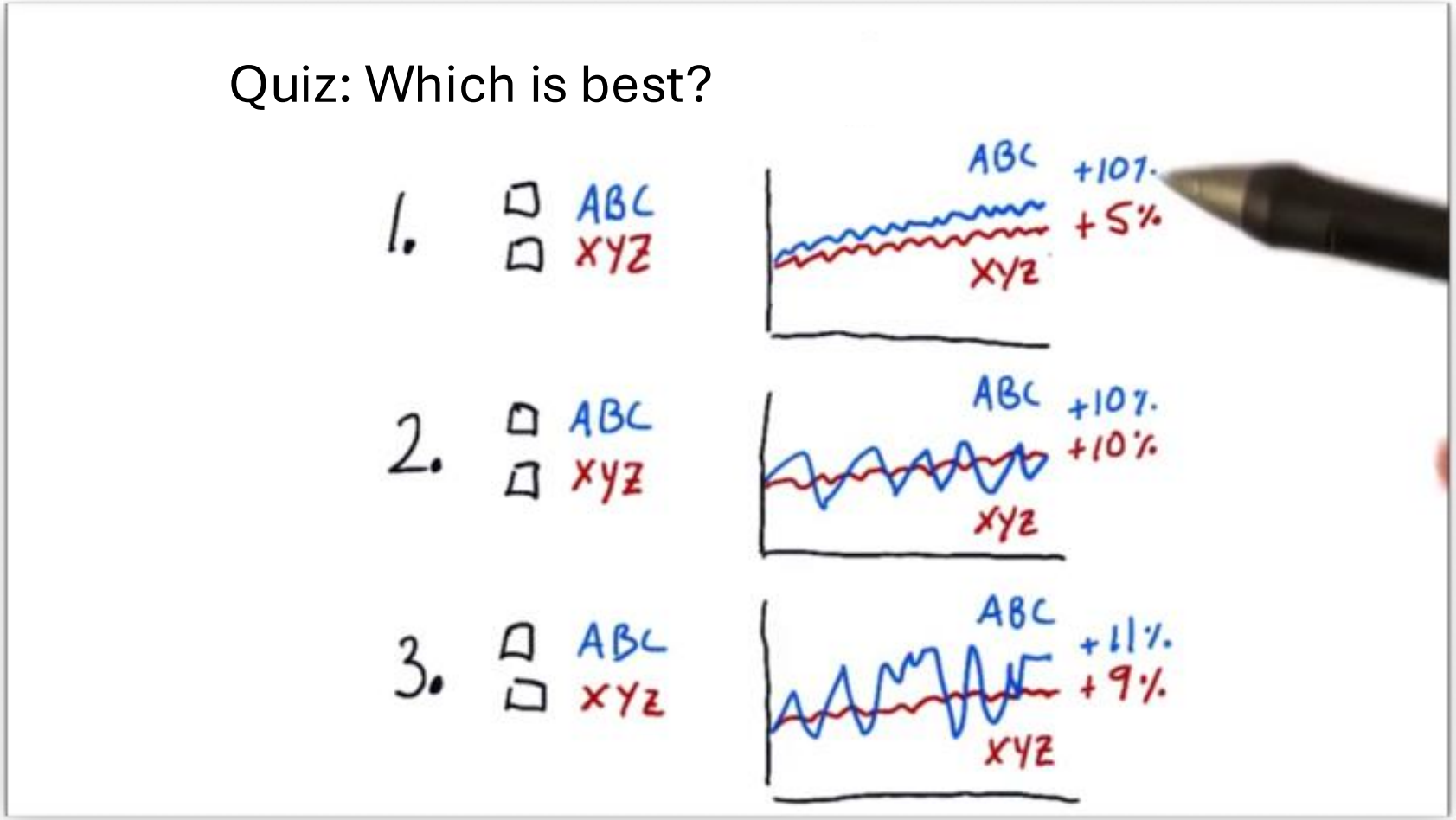
At the bottom of your table (around row 253), skip a row in column I, then calculate the average daily return by typing something like “=AVERAGE(I2:253)”. Check that your table goes down to exactly row 253; if it’s a bit different, then edit my final row number to match the actual end of your dataset.

In the next row, again in column I, calculate the standard deviation as “=STDEV.S(I2:253)”, again adjusting the lower row number as appropriate.

Plot and Compare Returns

Similar to plotting prices.

Risk Adjusted Returns



The Sharpe Ratio

Sharpe ratio = K * (average return – risk free return) / stdev (returns)

For daily returns K = sqrt(252)

Compute and compare Sharpe ration for SPY and NVDA

Software You Need: Tableau

- Go to https://tableau.com/tft/activation
- Click “download tableau desktop”
- Launch the downloaded .exe file
- Click “activate with product key”
- Enter “TCA5-1FCE-D840-0BA9-A3F2”

Software You Need: PyCharm

- Go to https://jetbrains.com/pycharm
- Click on “download”
- Click on “PyCharmSDFDK.exe”
- You now have a 30 day free trial.

- Later…
- Go to the website and click “Pricing”
- Click “Students, teachers & Community”
- Click “apply now”

Software You Need: R and Rstudio

- Go to https://cran.r-project.org/bin/windows/base/
- Click on “download R-4.4.1 for Windows”
- Click on the downloaded .exe file.
- Go to https://posit.co/download/rstudio-desktop/
- Be sure that you install R before installing Rstudio. Once R has been successfully installed, install Rstudio.

Software You Need: Power BI

- Go to https://myapplications.microsoft.com
- Click on Power BI.
- Click on “download”

“Homework”

- Visit https://tuckerbalch.com/MF-Bootcamp
- Finish up any software installs
- Take the survey.

- https://www.surveymonkey.com/r/DLNSNCV

Software/Data We Did Not Install (but might need later)

- Refinitiv EIKON (bootcamp 1)
- Wharton Research Data Services (WRDS) https://wrds-www.wharton.upenn.edu/
- Anaconda environments (bootcamp 1)
- Jupyter in Anaconda (bootcamp 1)
- FactSet in Excel (bootcamp 1)