

# Financial Modeling with Python and Excel

## An Introduction

Nick DeRobertis<sup>1</sup>

<sup>1</sup>University of Florida  
Department of Finance, Insurance, and Real Estate

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1 Introduction to Financial Modeling

2 Introduction to the Modeling Toolset

# What is this Class?

- This is a skills-based course focused on teaching financial modeling techniques in Python and Excel
- The focus is not a lot of specific models, but rather general model-building techniques
- The focus will be simple models, but extending them in powerful ways



# What is a Model?



# A Retirement Problem

## A General Structure

Inputs



Process



Outputs

## Real-world Problem

Wages, Savings



Investment



Cash in the  
bank, person  
retires

## A Model of the Problem

Cash Flows, Savings  
Rate, Interest Rates



Model

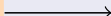


FV of CF, time  
until retirement

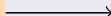
# Valuing a Company (DCF Model)

## A General Structure

Inputs



Process



Outputs

## Real-world Problem

Microsoft  
creates soft-  
ware



Sells the software



Generates cash for  
investors, stock  
reaches a price

## A Model of the Problem

Revenue, COGS,  
SG&A, growth rates,  
costs of capital, etc.



Model

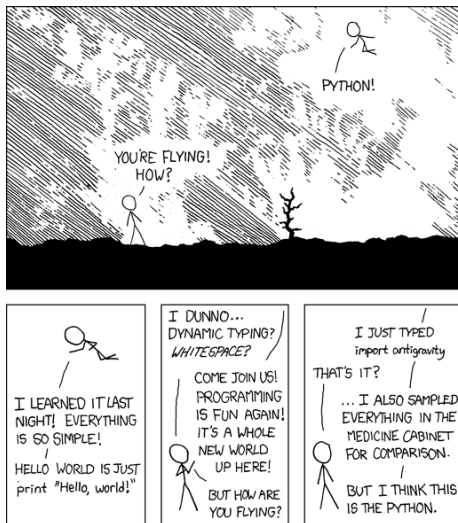


Stock price,  
stock returns

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# Why Python?





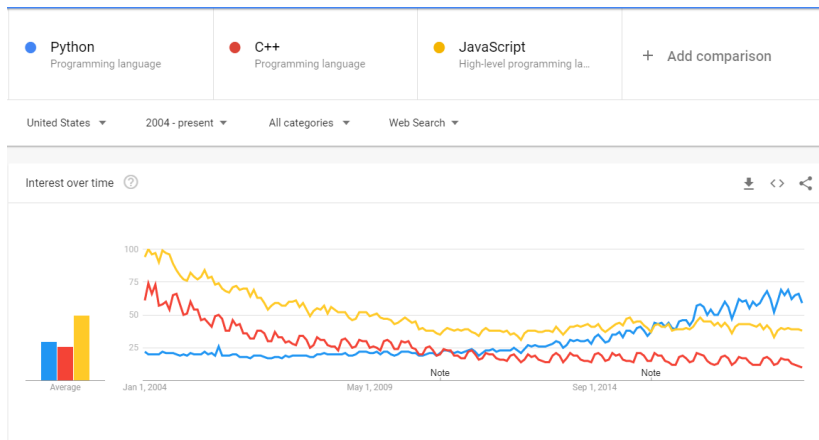
# Python is a Good Choice for Finance

- The easiest to learn mainstream programming language
- Heavily used in the financial industry

## Python is the Most Flexible of the Top Languages

- Modeling
- Data science
- Algorithmic Trading
- Scripting
- Devices
- Web Development
- Web Scraping
- Even these slides

# Python is the Fastest Growing Programming Language



# More Python Advantages

- Open source - completely free and open
- Focus on readability - almost pseudo-code
- Take as much as you need. Easy for beginners, many features for experts.
- Deep integrations with Excel - VBA replacement, run Python in Excel, run Excel from Python

# Why Not use Python?



```
doug@doug: ~  
File Edit View Search Terminal Help  
doug@doug:~$ python3  
Python 3.6.6 (default, Sep 12 2018, 18:26:19)  
[GCC 8.0.1 20180414 (experimental) [trunk revision 259383]] on linux  
Type "help", "copyright", "credits" or "license" for more information.  
>>> █
```

# Python Disadvantages


- No graphical interface (by default)
- Hard to get others working with it if they don't know Python
- Can take more work to get started on a project

# Why Not use VBA?

(General)

```
Sub Range_Find_Method_Row()  
    'Finds the last non-blank row on a sheet/range.  
  
    Dim lRow As Long  
  
    On Error Resume Next  
    lRow = Cells.Find(What:="*", _  
                      After:=Range("A1"), _  
                      LookAt:=xlPart, _  
                      LookIn:=xlFormulas, _  
                      SearchOrder:=xlByRows, _  
                      SearchDirection:=xlPrevious, _  
                      MatchCase:=False).Row  
  
    On Error GoTo 0  
  
    MsgBox "Last Row: " & lRow  
  
End Sub
```

What does all this code mean???



# VBA is Old-School

- Code is not as readable as Python
- Power is limited to working within Microsoft Office
- Python has a complete VBA API built into a package - Python can do VBA and more



# We Can't Ditch Excel Yet

- Excel is everywhere. Most of the world's data is in Excel spreadsheets
- (Nearly) everyone knows how use it
- You can see what you're doing (without effort)
- Easy introspection into a particular value



# Escaping Excel Hell



# The Pains of Excel

- Code and view are mixed together, code is hidden
- Both cell formulas and VBA macros - What is going on?
- Easy to make mistakes (one cell different)
- Some tasks which are very simple in Python are very complex in Excel

# Let's Get Python Set Up on your System

## Install Steps

- 1 Go to <https://www.anaconda.com/products/individual> to download Python 3.8
- 2 Follow the steps in the installer
- 3 You will hit "Advanced Installation Options". It is very important that you select "Add Anaconda to my PATH environment variable". It says it is not recommended, and will highlight it in red when checked, but we will need it later in the course.
- 4 Open CMD (windows key, search cmd)
- 5 Type `python` and hit enter. You should see Python 3.8 and a `>>>` come up.

Make sure you have selected Python 3.8 and not 2.7

# Lecture Resources

## Lecture Resources

- 1 [Syllabus](#)
- 2 [Course Schedule](#)
- 3 [Slides - Financial Modeling with Python and Excel](#)
- 4 [Lecture Notes - Financial Modeling with Python and Excel](#)