

Combining Excel and Python

Using xlwings to Run Excel from Python

Nick DeRobertis¹

¹University of Florida
Department of Finance, Insurance, and Real Estate

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Leveraging the Power of Both Tools

- We have learned how to use both Excel and Python to solve problems. Throughout this process, there were advantages and disadvantages of each tool for each problem.
- I wanted you to know both tools so you could pick whichever is best to tackle your problem
- For larger problems, you'll likely find some parts are better with Excel and some with Python
- After this lecture, you won't need to choose one anymore, you can use both at once.

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How Far does pandas Get Us?

- pandas has built-in tools for working with Excel
- pandas can read Excel workbooks into DataFrames and it can write DataFrames back to Excel workbooks
- For simple uses, this may be enough. If you just need to get data from somewhere once and put it in your workbook, or you have your data in Excel and want to analyze it in Python, this is sufficient
- If you want to manipulate your workbook from Python, or you want to run Python code from your workbook, look to xlwings

Reading and Writing to Excel Files with pandas

Reading Excel Files

```
df = pd.read_excel('data.xlsx', sheet_name='My Data')
```

- If you don't pass a sheet name, it will take the first sheet.

Writing to Excel Files

```
df.to_excel('data.xlsx', sheet_name='My Data', index=False)
```

- We are passing `index=False` because usually the 0, 1, 2 ... index is not useful
- If you had set your index to something useful, then don't include `index=False`

Careful When Writing!

When pandas writes to a workbook, it replaces the file. Do not write over an existing workbook that you want to keep!

Showcasing Reading and Writing to Excel Files

Read and Write to Excel using pandas

- Download the contents of the "Read Write Excel Pandas" folder in Examples
- Ensure that you put the Excel file and notebook in the same folder for it to work
- Follow along with the notebook

Reading and Writing to Excel with pandas, Level 1

Reading and Writing to Excel, Level 1

- 1 Download "MSFT Financials.xls" from Canvas in Lab Exercises -> Read Write Excel Pandas
- 2 Read the sheet "Income Statement" into a DataFrame
- 3 Write the DataFrame to a new workbook, "My Data.xlsx", with the sheet name "Income Statement"

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Introducing xlwings

- The easiest way to use Python from in Excel, or Excel from in Python, is xlwings
- In Windows, it's based off the Microsoft COM API, which is some common tools they give for creating plugins.
- It's still in active development, but overall it works pretty well and is far beyond where we were a few years ago



What are the Main Ways to use xlwings?

- There are two main ways to use xlwings
- You can **manipulate Excel from Python**, which gives you the full power of Excel from within Python. In this class we'll focus on reading and writing values, but you can do anything that you would normally be able to in Excel, but by executing Python code.
- Or you can **run Python from Excel** using one of two approaches: Python as a VBA replacement and user-defined functions (UDFs)
- We will focus on manipulating Excel from Python in this class. I encourage you to explore the other two approaches on your own.

Using Python to Drive Excel Models

- xlwings allows us to write Python values into Excel and fetch Excel values into Python
- There is also a complete VBA API, meaning you can do everything that you could do with VBA from within Python, which means you have the full capabilities of Excel within Python
- There are also convenient features to work with entire tables at once rather than a single value



Write and Read Values to and from Excel

Read Values from Excel

```
my_value = sht.range("G11").value  # single value
# all values in cell range
my_value = sht.range("G11:F13").value
# expands cell range down and right getting all values
my_values = sht.range("G11").expand().value
```

Write Values to Excel

```
sht.range("G11").value = 10
sht.range("G11").value = [10, 11]  # horizontal
sht.range("G11:G12").value = [10, 11]  # vertical
# table, DataFrame from elsewhere
sht.range("G11").value = df
```

How to Use xlwings

Trying out xlwings

- Download the contents of the "xlwings" folder in Examples
- Ensure that you put the Excel file and notebook in the same folder for it to work
- Follow along with the notebook

Reading and Writing to Excel with xlwings, Level 1

Dynamically Reading and Writing to Excel, Level 1

- ① For all of the xlwings lab exercises, work with "xlwings Lab.xlsx".
- ② Use xlwings to read the values in the column A and then write them beside the initial values in column B

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Reading and Writing to Excel with pandas, Level 2

Reading and Writing to Excel, Level 2

- 1 Use the same "MSFT Financials.xls" from the first exercise on Slide 8
- 2 Output to five separate workbooks, named "My Data1.xlsx", "My Data2.xlsx", and so on.
- 3 Do this without writing the `to_excel` command multiple times

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Reading and Writing to Excel with pandas, Level 3

Reading and Writing to Excel, Level 3

- 1 Note: this exercise uses the Advanced material covered in Examples -> Read Write Excel Pandas
- 2 Use the same "MSFT Financials.xls" from the first exercise on Slide 8
- 3 Output to five separate sheets in the same workbook "My Data.xlsx". The sheets should be named "Income Statement 1", "Income Statement 2", and so on.
- 4 Do this without writing the `to_excel` command multiple times

Level 1: Slide [8](#)

Level 2: Slide [16](#)

Reading and Writing to Excel with xlwings, Level 2

Dynamically Reading and Writing to Excel, Level 2

- 1 Get the value in C9 and multiply it by 2.5 in Python

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Reading and Writing to Excel with xlwings, Level 3

Dynamically Reading and Writing to Excel, Level 3

- 1 Read the table which starts in E4 into Python. Multiply the prices by 2.5, and then output back into Excel starting in cell H5.
- 2 Ensure that the outputted table appears in the same format as the original (pay attention to index and header)

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Reading and Writing to Excel with xlwings, Level 4

Dynamically Reading and Writing to Excel, Level 4

- 1 In column L, write 5, 10, 15 ... 100 spaced two cells apart, so L1 would have 5, L4 would have 10, and so on.

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