

Introduction to Excel for Statistical Analysis

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Northeastern University
NULab for Texts, Maps, and Networks

*Feel free to ask questions at any point
during the presentation!*

Workshop Agenda

- Objectives
- About Excel
- Important Vocabulary and Functions
- Demonstration
- Activity: Practice Excel

Slides, handouts, and data available at

<http://bit.ly/dti-dev-econ-fall2019>



Workshop Objectives

- Understand the data structures of Excel
- Learn how to use basic Excel functions, such as =ADD and =SUM
- Learn how to analyze your data with pivot tables and charts
- Learn more advanced calculations like regression models



Example

Briefly walk through a project that was done before using a similar tool/method:

- Research question
- Data collection
- Data analysis and results
- How these results can be interpreted to answer the research question
- Include screenshots maybe?



Excel

Excel is a program that is used to create and edit spreadsheets. In Excel, data are organized into rows and columns; this data can be presented and analyzed using Excel's functions, such as pivot tables, charts, formulas, and more.



Why Excel?

Excel is an excellent way to store, organize, and analyze data. It is particularly useful for quantitative analysis because most of its functions revolve around numerical data. Excel is also often used across the disciplines.

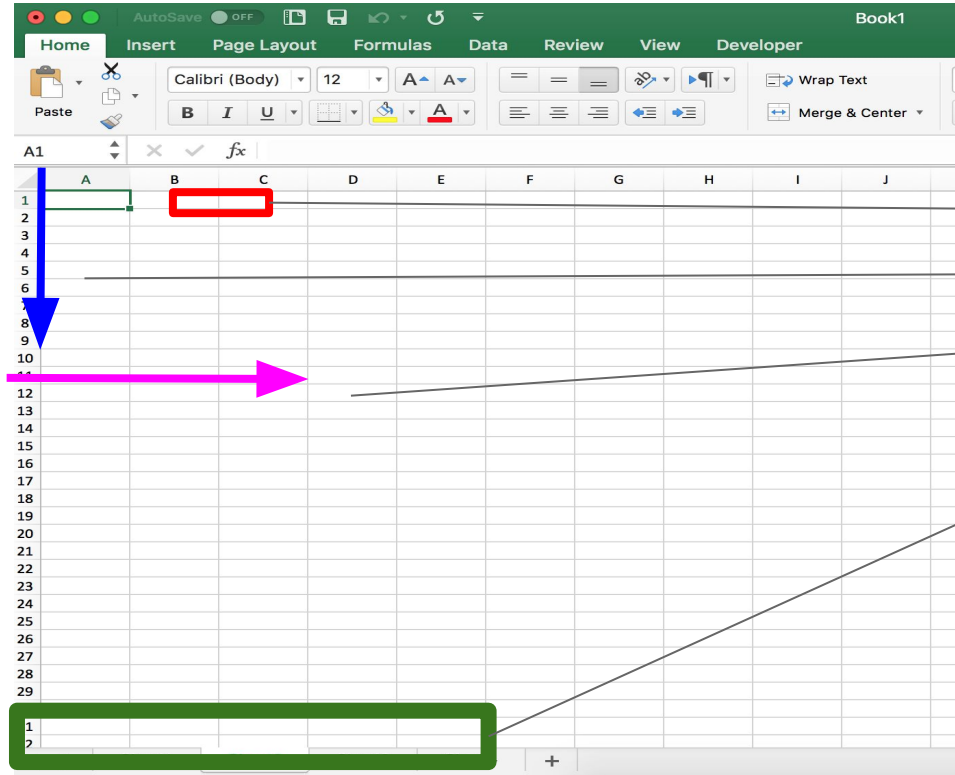


Important Vocabulary

- **Workbook:** The overall Excel file that you are creating
- **Sheet:** Excel workbooks can consist of multiple sheets (add at the bottom of the program) that you can rename
- **Row:** numerical (horizontal)
- **Column:** alphabetical (vertical)
- **Cell:** each box is called a cell and has an ID based on its row and column placement (A1, A2, A3, etc).



Anatomy of Excel



CELL



COLUMN



ROW



SHEET



Important Excel Features

- Pivot Tables: Analyze and calculate numerical data using mean, median, standard deviation, addition, subtraction, and other forms of arithmetic
- Function: similar to a pivot table, is able to calculate and analyze numerical data
- Charts: Visualize data with bar charts, scatter plots, and other types of visualizations
-



How to Select Data

If you have a long dataset, it can be hard to drag your mouse down to the bottom of the dataset. Click

SHIFT + COMMAND/CONTROL + DOWN ARROW (or whatever direction)

The end of the data will be selected in the direction of the arrow you choose.



Basic Calculations

Using **pivot tables** or **functions**, you can find the:

- Average
- Mode & Median
- Addition, subtraction, division, multiplication
- Standard deviation
- Min/max values
- Correlation



Functions for Excel

- In an empty cell, type = and then the proper calculation:
 - Correlation: CORREL(
 - Sum: SUM(
 - Average: AVERAGE(
 - Standard Deviation: STDEV(
- Select the range to calculate. If you are in the function cell still, the range will be automatically added for you as you select
 - Example: CORREL(B2:B20,C2:C20). B2:B20 is one range of values, while C2:C20 is another range.

D	E
hhe	
82.19051	
85.88746	=SUM(D2:D551
40.38055	SUM([number1],
40.68994	
49.5274	
67.08327	
42.86265	
65.08897	E7
36.52134	
47.16312	
37.96223	

The selected data (D column from rows 2-551)

The function (SUM) with the selected data



Your Turn!

Use the data emailed to you (also available the bit.ly link below) to calculate these for the “agehh”:

- Average
- Sum
- Median

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Pivot Tables for Calculations

- Select the data you want to be calculated (can be more than one variable)
- Go to “Insert” > “Table” > “Pivot Table”
- Choose a new worksheet or add to your existing sheet. Creating a new worksheet is cleaner
- Go to “Pivot Table Analyze” to edit the table:
 - “Field Settings” and choose the calculation (or right click the top of the table)



Example of Pivot Tables

Row Labels ▼	Average of hhe	Sum of hhe
34	67.40711229	38530.49088
99	72.46467868	
Grand Total	70.05543796	

Pivot table with **one** variable (looking at the average, but can look at other calculations)

Pivot table with **two** variables (comparing one variable's values to another variable's values). This pivot table shows the average "hhe" for each of the variables in the "local" row.



Your Turn! Create your own pivot table

Find the average variables of the column “agehh” for each of the variables in the “eduhh” columns.

- Select the two columns (Shift+Command/Cntrl+Down Arrow)
- Click “Insert” then “Pivot Table”
- Use the PivotTable Fields to select both the “agehh” and “eduhh” columns
- Make “educhh” the pivot table’s rows and make the values the average of “agehh”



More Advanced Calculations - LINEST

LINEST is a statistical function that use the least squares method to calculate a regression line. OLS Equation:

$$y = a + bx_1 \dots bx_n$$

- y = expected value
- a = intercept
- $bx_1 \dots bx_n$ = beta-coefficient (b) * value (x)



LINEST Excel Syntax

LINEST(y_values, x_values, constant, additional_statistics)

- Note: x_values, constant, and additional_statistics are OPTIONAL

What is the relationship between Log GDP and
Absolute Latitude?

=Linest(A2:A157, B2:B157, TRUE,TRUE)

=0.042391415

Function Arguments

LINEST

Known_ys	A2:A157	= {7.38135337829589;8.84091567993164
Known_xs	B2:B157	= {33;12.3000001907348;24.00000190734
Const	TRUE	= TRUE
Stats	TRUE	= TRUE

Returns statistics that describe a linear trend matching known data points, by fitting a straight line using the least squares method.

Known_ys is the set of y-values you already know in the relationship $y = mx + b$.

Formula result = 0.042391415

[Help on this function](#)

OK Cancel



Alternative Excel Regression Method

- Use the “Analysis ToolPak” Add-in
 - Then Data → Data Analysis → Regression

SUMMARY OUTPUT									
Regression Statistics									
Multiple R	0.579960115								
R Square	0.336353735								
Adjusted R Square	0.332044343								
Standard Error	1.033112431								
Observations	156								
ANOVA									
	df	SS	MS	F	Significance F				
Regression	1	83.30584911	83.30584911	78.05133226	2.12749E-15				
Residual	154	164.3674796	1.067321296						
Total	155	247.6733287							
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%	
Intercept	7.914706459	0.151436576	52.26416657	6.6191E-100	7.61554531	8.213867607	7.61554531	8.213867607	
X Variable 1	0.042391415	0.004798304	8.834666506	2.12749E-15	0.032912423	0.051870408	0.032912423	0.051870408	

Regression

Input

Input Y Range:

Input X Range:

☐ Labels ☐ Constant is Zero

☐ Confidence Level: %

Output options

☐ Output Range:

☒ New Worksheet Ply:

☐ New Workbook

Residuals

☐ Residuals ☐ Residual Plots

☐ Standardized Residuals ☐ Line Fit Plots

Normal Probability

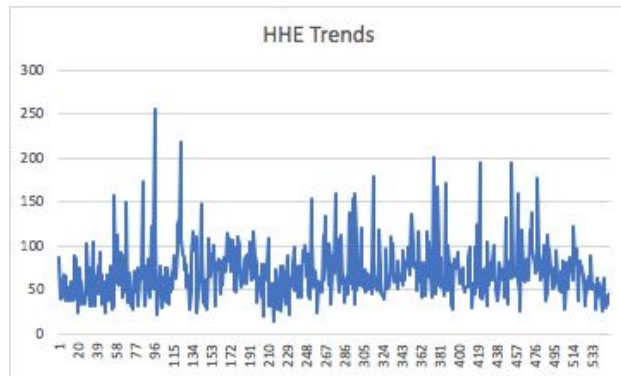
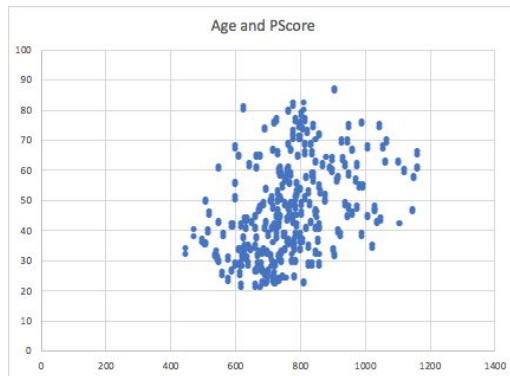
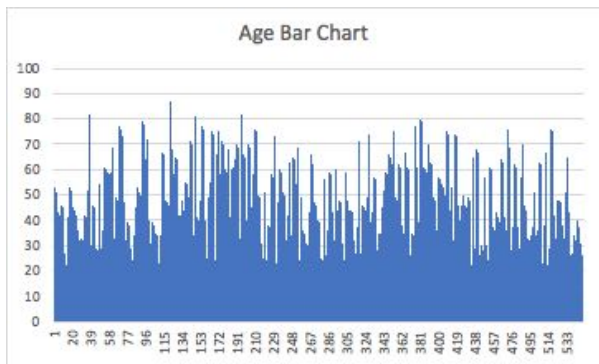
☐ Normal Probability Plots

OK Cancel Help



Charts

- Scatter plots: comparing **two** variables
- Bar charts/histograms: count of **one** variable
- Line charts: tracing **trends** of one or two variables



Inserting a Chart

- Similar to a pivot table, click the columns and variables you would like to include
 - For multiple columns, you may need to move the columns next to each other to be able to select multiple columns.
- Go to “Insert” and then “Charts” (often, recommended charts will suggest what you want)
- Use the “Chart Design” and “Format” toolbar at the top and/or the side toolbar to play with the formatting of the chart



Your Turn!

Create two charts.

- Histogram for “hhe”
- Scatterplot for “agehh” and “eduhh”

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Group Discussion

- First, does anyone have questions?
- How was using Excel? What are some easy features?
- What are some more difficult features you anticipate running into?
- How might you use Excel in the future?



Thank you!

If you have any questions, contact us at:

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Office Hours: **Tuesdays from 1–3PM in 401 Nightingale Hall**



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