Introduction to Excel for Statistical Analysis

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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

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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

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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?

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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.

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Why Excel?

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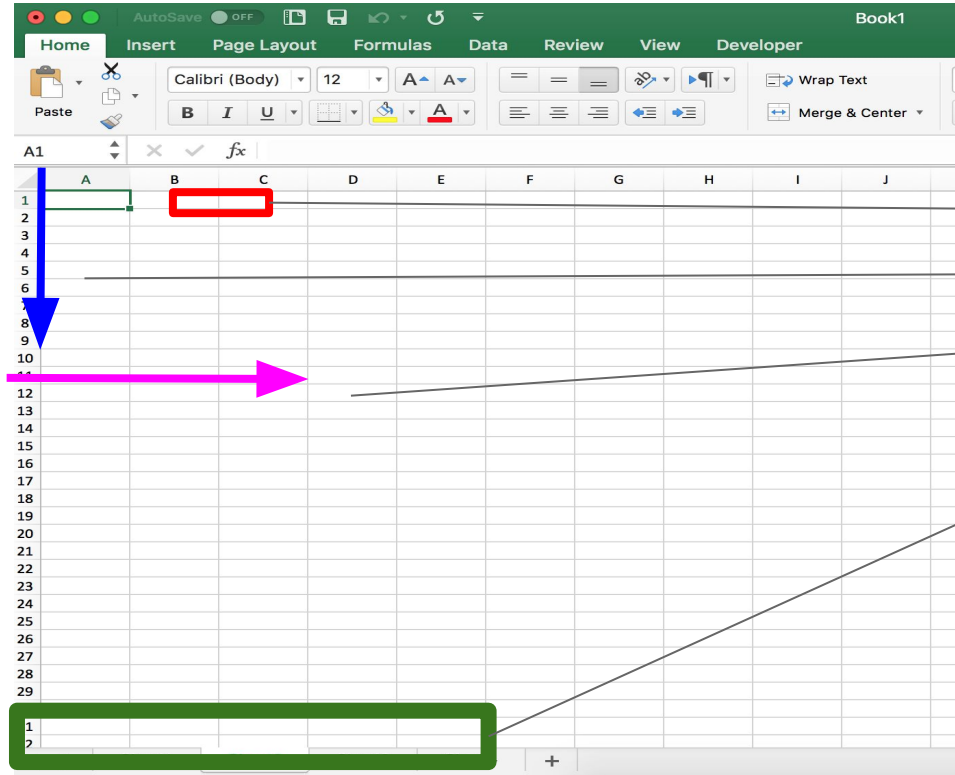
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Important Vocabulary

- **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).

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Anatomy of Excel

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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

-

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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.

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Basic Calculations

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

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

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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.

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

The function (SUM) with the selected data

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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)

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Example of Pivot Tables

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

Sum of hhe
38530.49088

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.

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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"

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More Advanced Calculations - LINEST

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

y = a + bx1…bxn

- y = expected value
- a = intercept
- bx1…bxn = beta-coefficient (b) * value (x)

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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 variable

"hhe" and variable "educhh?"

=Linest(A2:A551, B2:B551, TRUE, TRUE)

=-2.0558007

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Alternative Excel Regression Method

- Use the "Analysis ToolPak" Add-in
  - Then Data → Data Analysis → Regression

SUMMARY OUTPUT					
Regression Statistics					
Multiple R	0.170762315				
R Square	0.029159768				
Adjusted R Square	0.027388162				
Standard Error	30.32197098				
Observations	550				

ANOVA					
	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	15133.23292	15133.23292	16.45950844	5.69217E-05
Residual	548	503843.2142	919.4219238		
Total	549	518976.4472			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	76.62921204	2.072964121	36.96600981	5.6084E-151	72.55728372	80.70114036	72.55728372	80.70114036
educhh	-2.055800695	0.506725288	-4.057031975	5.69217E-05	-3.051162374	-1.060439016	-3.051162374	-1.060439016

Regression   ?   ×

Input

Input Y Range: $A$1:$A$551   ⬆   [OK]

Input X Range: $B$1:$B$551   ⬆   [Cancel]

☑ Labels   ☐ Constant is Zero   [Help]

☐ Confidence Level: 95   %

Output options

○ Output Range: ⬆

◉ New Worksheet Ply:

○ New Workbook

Residuals

☐ Residuals   ☐ Residual Plots

☐ Standardized Residuals   ☐ Line Fit Plots

Normal Probability

☐ Normal Probability Plots

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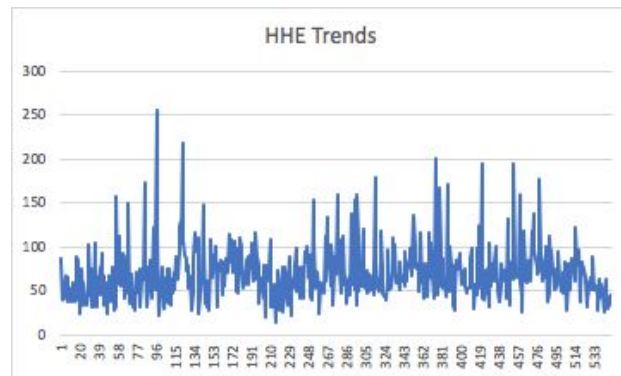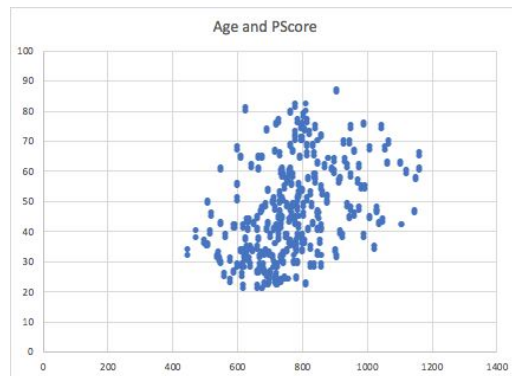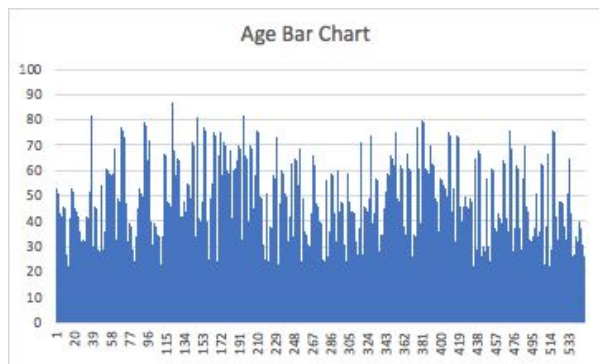
Charts

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

Age Bar Chart

Age and PScore

HHE Trends

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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

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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?

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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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