Stata Summer Series

Stata 100 – Intro to Stata

What you will get out of this session:

- What is Stata? What can it do?
- Why use Stata? How can we streamline and document our work?
- How do I import, examine, and save a dataset?
- What resources are available if I need help?

Basic command structure

```
command   objects    conditions          , options
use       file.dta                       , clear
generate  age = 15   if AGE2 == 15
tabulate  state      if country == "US" , missing
```

Helpful resources

- Stata manual: access by typing "help command" in the stata console
- Statalist: https://www.statalist.org/forums/forum/general-stata-discussion/general
  - Often will come up if you google a question that isn't covered by the documentation
- UCLA IDRE: https://stats.idre.ucla.edu/stata/
  - Provides helpful tips on how to use Stata as well as the statistics behind the programming
- UNC CPC: http://www.cpc.unc.edu/research/tools/data_analysis/statatutorial
  - Guide to working with and analyzing data in Stata

Remember: Getting errors is a normal part of programming! The best way to debug is to read through every line carefully

Next classes:

- Stata 101 – **Hands-on Intro Stata Workshop** (Friday, July 13, 2018 12:00 pm-1:30 pm, 7A)
- Stata 102 – **Data Cleaning** (Friday, July 20, 2018 12:00 pm-1:30 pm, 6A)
- Stata 201 – **Automating Tasks** (Friday, July 27, 2018 12:00 pm-1:30 pm, 6A)
- Stata 301 – **Regression Analysis** (Friday, August 3, 2018 12:00 pm-1:30 pm, 6A)
- Stata 302 – **Additional Topics in Regression Analysis** (Friday, August 10, 2018 12:00 pm-1:30 pm, 6A)

Stata 100 Training Handout

6/29/2018

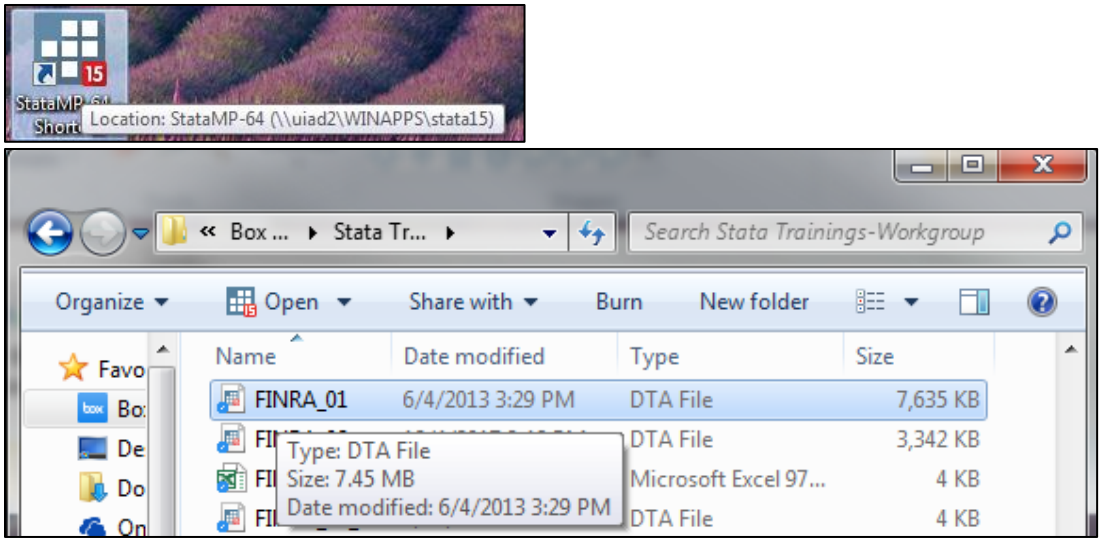
Agenda:

1. Introductions
2. What is Stata? Why use it?
3. Goal: Set up a file, have it do everything, output the things you want.
4. How to actually use Stata. Our focus today is to orient ourselves with the program and how to write commands.
    a. In general the steps for an analysis are: Get data, clean/rework data, analyze data, and output results.

****Please feel free to ask questions at any point of the session.****

How do I open this?

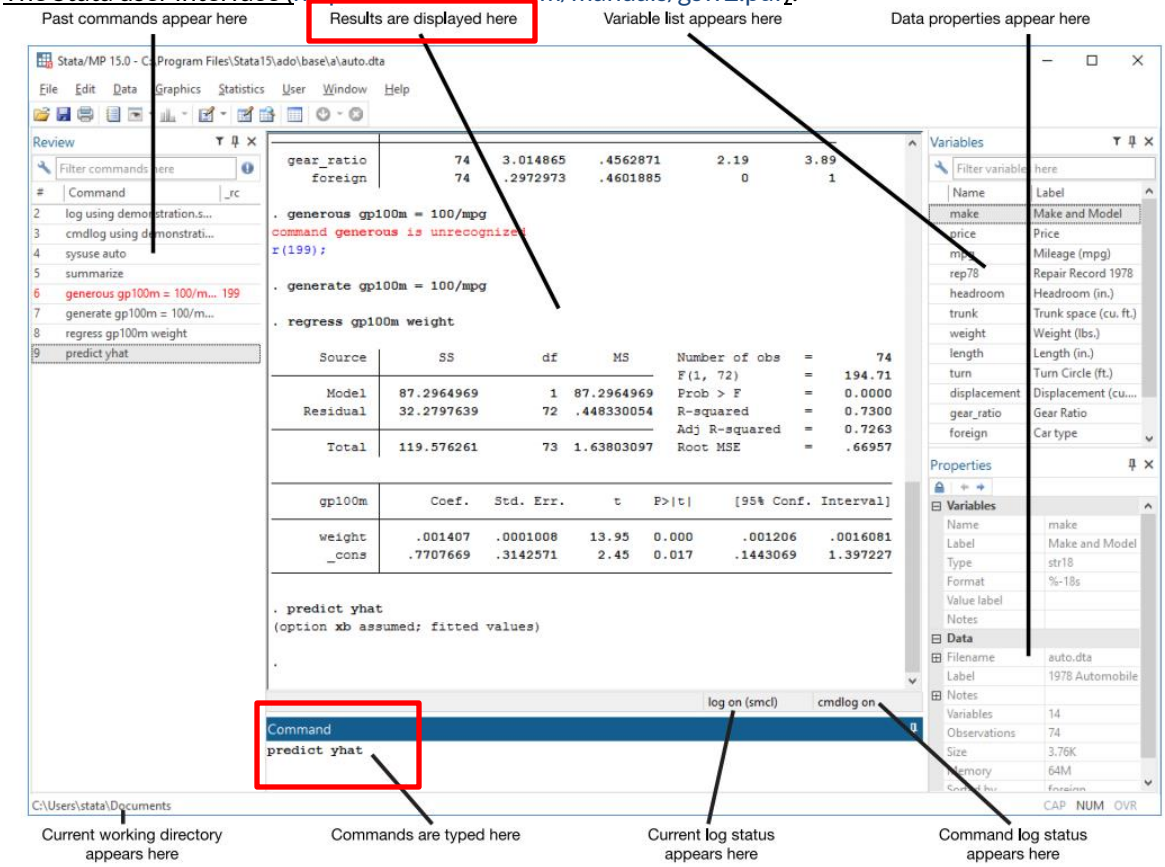
Click to open a shortcut to the Stata program (make sure IT has installed) or a Stata data (.dta), script (.do), or other file type (.log, .smcl, .ado, etc.) associated with it. It's just like Microsoft Word in that you can open it by clicking the icon or opening a word document or template.



What am I looking at?

The main Stata console that opens up is your home base. Anything that you "do" will show up here. There's a lot happening here, so for now focus on the **Results window** (center) and **command line** (bottom).

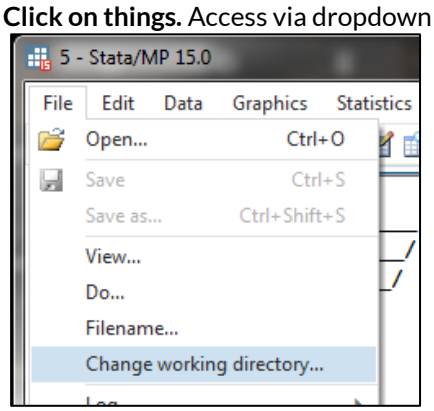
The Stata user interface (https://www.stata.com/manuals/gsw2.pdf):

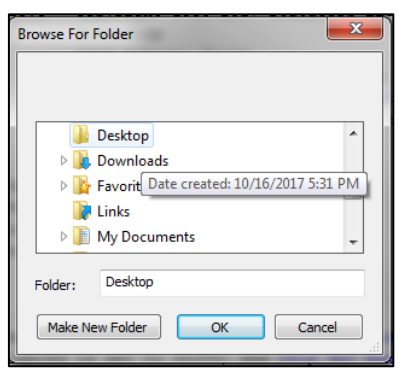


In this handout: `Courier` text is Stata code, *italicized* text signifies variable names, and underlined text denotes menu selections.

Three ways to do the same thing

1. **Click on things.** Access via dropdown menus



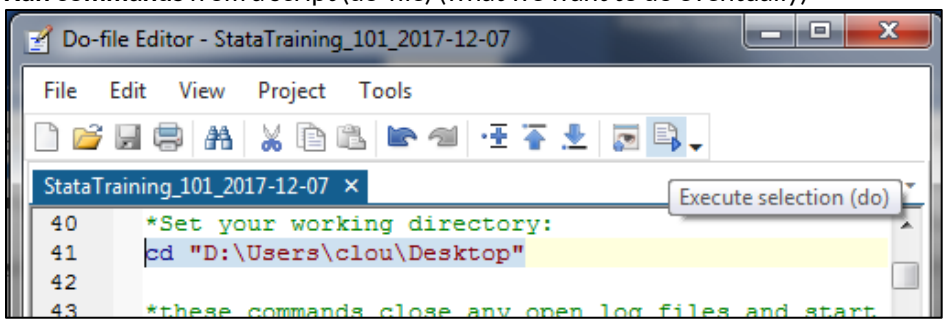


2. **Type in a command** in the command window:
   e.g. `cd "D:\Users\clou\Desktop"`

Basic command structure

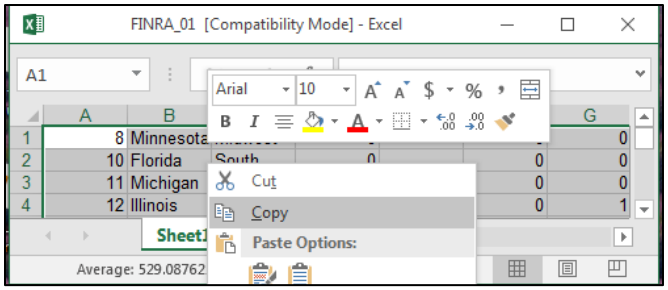
```
command   objects    conditions          , options
use       file.dta                       , clear
generate  age = 15   if AGE2 == 15
tabulate  state      if country == "US" , missing
```

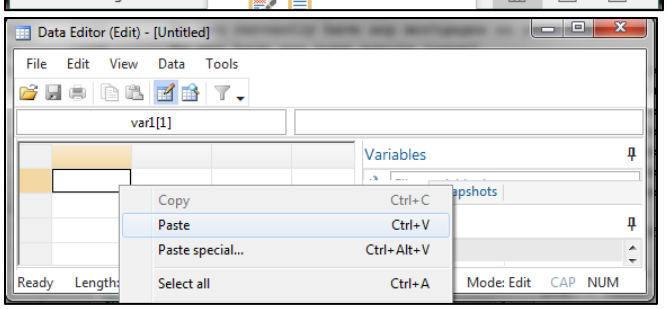
3. **Run commands** from a script (do-file) (what we want to do eventually)



How do I get data in here?

1. **Manually enter data or copy/paste** from a spreadsheet into browser in edit mode.
   - Click Data>Data Editor> Data Editor (Edit) or 
   - Type: `edit` –

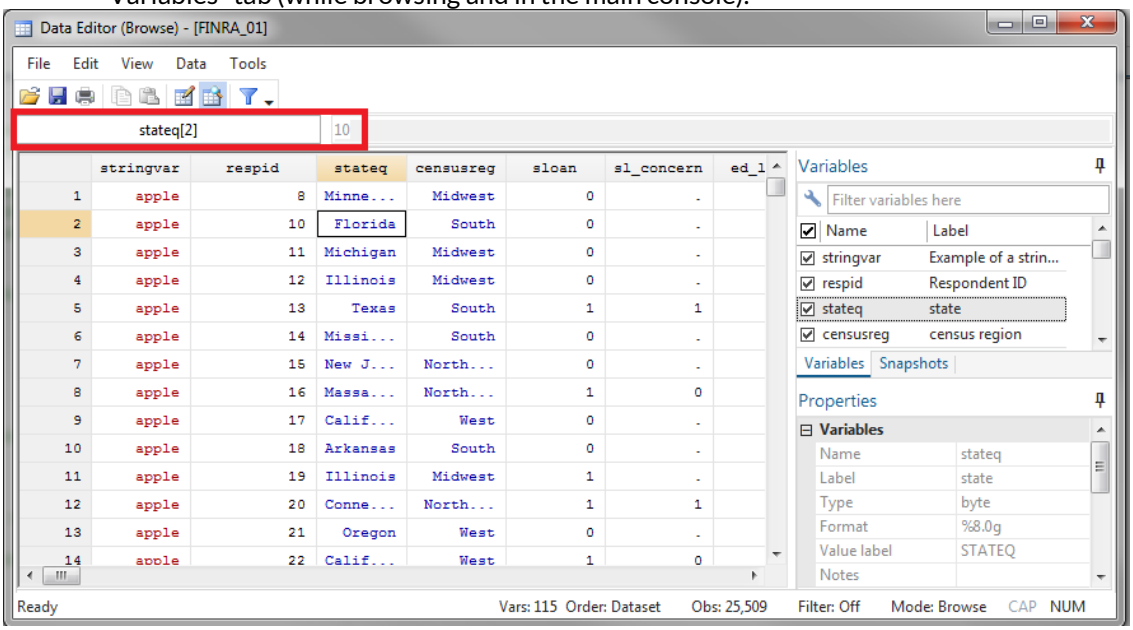




2. **Import from a non-stata file type** (like how Microsoft word needs to convert a PDF before it can open it as a word doc)
   - file>import>Excel Spreadsheet [or your file type]
   - `import excel "FINRA_01.xls", sheet("Sheet1") clear`
3. **Open existing dataset** (already a stata file)
   - file>open
   - `use "FINRA_01.dta", clear`

How do I look at my data?

Using the data editor in browse mode (Data>Data Editor> Data Editor (Browse) or  or `browse`), you can see that data stored in Stata basically looks like a spreadsheet.

- Rows = records or observations (e.g. respondents of a survey)
    - Sample size (N) is the total of all the rows.
- Columns = variables or characteristics (e.g. age, state)
    - One advantage of Stata is you can really easily search and look at groups of your variables in the "Variables" tab (while browsing and in the main console).
- 

There are several different data types. This is important to know because Stata is rigid in how it stores data, and you will run into errors/issues if your variables are not in the right type.

- **Numeric** variables such as *respid* above contain discrete (integer) or continuous numeric data and appear in black (`8,10,etc.`). You can manipulate this data like regular numbers (i.e. add values, multiply them, etc.).
    - **Dummy variables:** Numeric variables with the values 0 or 1 are a specific type of numeric variable called a dummy, binary, or indicator variable. A value of `1` means a record has the quality the variable's name indicates.
- **String** variables contain text and appear in red (`apple`). Always use double quotes for these values in your commands and code (`"apple"`). Adding strings concatenates text and "string functions" are used to manipulate them.
- **Labeled numeric** variables: Variables whose data appears in blue like *stateq* above are labeled numeric variables. They appear as text (`Florida`) in the browser and in the output for most commands but actually have a numeric value underlying them (`10` for `Florida` in the above example) which must be referenced in commands/code.
    - Labeled numeric variables often signify categorical or ordinal variables where the underlying numeric value does not contain useful information beyond degree (i.e. a red car is not "2x" a blue car).

Note: there are special values for missing data for numeric (. [period]) and string (`""` [empty string]) variables. The missing value for numeric data (.) is the highest numeric value and empty strings (`""`) are the lowest string value in Stata, which is important for subsetting and recoding variables (more on this below). Other special values such as "don't know," "refused," etc. for numeric variabls are also often coded as negative or extremely high values—refer to the data dictionary or codebook for your particular dataset.

We can see differences between these different types of data using the **display** function (basically a calculator). Add `2+2` vs. `stringvar+"2"` and `display` the value of the *stateq* variable for the 1st record:

```
. display 2+2
4
```

```
. display stringvar +"2"
apple2
```

```
. display stateq
24
```

How can I get to know my data?

One advantage of using Stata versus Excel: it's relatively easy to run diagnostics or descriptive statistics for all or part of your data set. A crucial first step in an analysis is becoming familiar with your data. Are there missing data? Do some variables have special values? Do some records look weird? Are the variables the expected format (e.g. is age a numeric variable, not a string)? There are many issues that could arise when becoming familiar with a new dataset and it's important to refer to their documentation for help.

1. **`describe`** provides basic information about the dataset and/or its variables including **name**, **data type**, and **label** (usually a description) if one exists. This is an easy way to see if all the variables you want are included, and if they're in the right format.

```
. describe

Contains data from D:\Users\clou\Desktop\FINRA_01.dta
  obs:        25,509
 vars:           115                          6 Dec 2017 12:13
 size:     7,907,790
-------------------------------------------------------------------------------
              storage   display    value
variable name   type    format     label      variable label
-------------------------------------------------------------------------------
stringvar       str5    %9s                   Example of a string variable
respid          long    %12.0g                Respondent ID
stateq          byte    %8.0g      STATEQ     state
censusreg       byte    %8.0g      CENSUSRE   census region
sloan           float   %9.0g                 R currently has student loans
sl_concern      float   %9.0g                 R concerned that s/he cannot pay back student loans
ed_lths         float   %9.0g                 Education is less than High School
```

2. **`codebook`** provides more information on variables adding in **range**, **number missing**, and **number of unique value**s as well as **example values** for categorical variables and **distribution** for numeric variables

```
respid                                                                Respondent ID
-------------------------------------------------------------------------------

                  type:  numeric (long)

                 range:  [8,75001]                    units:  1
         unique values:  25,509                   missing .:  0/25,509

                  mean:   30698.5
             std. dev:   21087.2

          percentiles:        10%       25%       50%       75%       90%
                             4034     12808     27066     48130     62813
```

```
stateq                                                                      state
-------------------------------------------------------------------------------

                  type:  numeric (byte)
                 label:  STATEQ

                 range:  [1,51]                       units:  1
         unique values:  51                       missing .:  0/25,509

             examples:  11    Georgia
                        21    Maryland
                        31    New Jersey
                        41    South Carolina
```

3. **`list`** will print a part of your data which can be useful to spot missing/special values & other issues.

```
. list stringvar respid stateq censusreg sloan sl_concern ed_lths in 1/10
```

	string~r	respid	stateq	census~g	sloan	sl_con~n	ed_lths
1.	apple	8	Minnesot	Midwest	0	.	0
2.	apple	10	Florida	South	0	.	0
3.	apple	11	Michigan	Midwest	0	.	0
4.	apple	12	Illinois	Midwest	0	.	0
5.	apple	13	Texas	South	1	1	0
6.	apple	14	Mississi	South	0	.	0
7.	apple	15	New Jers	Northeas	0	.	0
8.	apple	16	Massachu	Northeas	1	0	0
9.	apple	17	Californ	West	0	.	0
10.	apple	18	Arkansas	South	0	.	0

How can I begin to see patterns and relationships in my data?

Stata can provide summary and descriptive statistics of your data faster than in Excel. The main relationships that tell you about your data are measures of central tendency (mean, median, mode) and spread/variability (range, standard deviation, variance).

1. Run descriptive statistics of your variables using
   - **`tabulate`** for categorical or ordinal (e.g. gender, educational level)
     - Takes all a variable's observations and gives you the frequency and percent of each value (among the total observations)
   - **`summarize`** for discrete or continuous numeric (e.g. age, wage)
     - Get the number of observations, mean, standard deviation, and range
     - Mean of a binary variable is the share of the total with that characteristic
   - either **`tabulate`** or **`summarize`** for dummies/binary/indicators:

Summarizing the age and binary white variables

```
. summarize A3A  r_white
```

Variable	Obs	Mean	Std. Dev.	Min	Max
A3A	25,509	47.00588	16.07551	18	101
r_white	25,509	.7336626	.4420514	0	1

Tabulating the education category variable

```
. tabulate ed_catvar
```

ed_catvar	Freq.	Percent	Cum.
Less than High School	1,903	7.46	7.46
High School or equivalent	6,561	25.72	33.18
Some College	8,419	33.00	66.18
College	5,343	20.95	87.13
Postgraduate Degree	3,283	12.87	100.00
Total	25,509	100.00	

Tabulating student loans with missing option to show . values

```
. tabulate sloan, missing
```

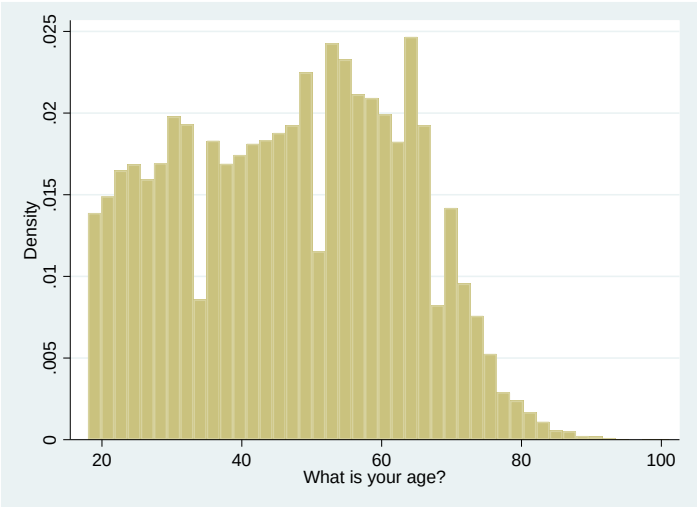
R currently has student loans	Freq.	Percent	Cum.
0	20,049	78.60	78.60
1	5,141	20.15	98.75
.	319	1.25	100.00
Total	25,509	100.00	

2. You can also crosstab two categorical/dummy variables with tabulate:

Below, we can easily see that most people who have student loans are in the categories “Some college” or “College.”

```
. tabulate ed_catvar sloan, missing

                      | R currently has student loans
            ed_catvar |         0          1          .     Total
----------------------+---------------------------------------------------
Less than High School |     1,765         94         44     1,903
High School or equiva |     5,849        612        100     6,561
         Some College |     6,311      2,013         95     8,419
              College |     3,739      1,551         53     5,343
  Postgraduate Degree |     2,385        871         27     3,283
----------------------+---------------------------------------------------
                Total |    20,049      5,141        319    25,509
```

3. Another way to look at your data is via graphs. E.g. histogram showing the distribution of age:



What if I only want to see descriptives for a subset of all the observations?

Stata can also work with a subset of your data more easily than Excel. What if I want to know the mean of everyone's age, but only for people with postgraduate degrees? What if I want the educational attainment of only college-aged students?

Use an **`if`** conditional statement (always before the comma for options) to specify the particular observations you want a command to operate on. **`if`** expressions use common comparator operators to specify one or more conditions observations must meet for the observations to be included in the operation:

- equals (==)
- not equals (`!=` or ~=)
- greater than (>)
- less than (<)
- greater than or equal to (>=),
- less than or equal to (<=)

You can combine operators with the following Booleans:

- and (`&`)
- or (`|`)

E.g. provide statistics of age or education observations below age 50:

```
. summarize A3A  if A3A < 50

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
         A3A |     13,507    34.19094    9.127357         18         49
```

```
. tabulate  ed_catvar  if A3A < 50

                ed_catvar |      Freq.     Percent        Cum.
------------------------------------------------------------
    Less than High School |      1,313        9.72        9.72
High School or equivalent |      3,350       24.80       34.52
             Some College |      4,307       31.89       66.41
                  College |      3,091       22.88       89.29
      Postgraduate Degree |      1,446       10.71      100.00
------------------------------------------------------------
                    Total |     13,507      100.00
```

Creating an expression with `in` instead of `if` will specify a subset of observations based on their record number/order rather than a set of conditions. E.g. we already used `list` to print out the values of a few variables for the first ten observations by including an expression with `in` (`in 1/10`):

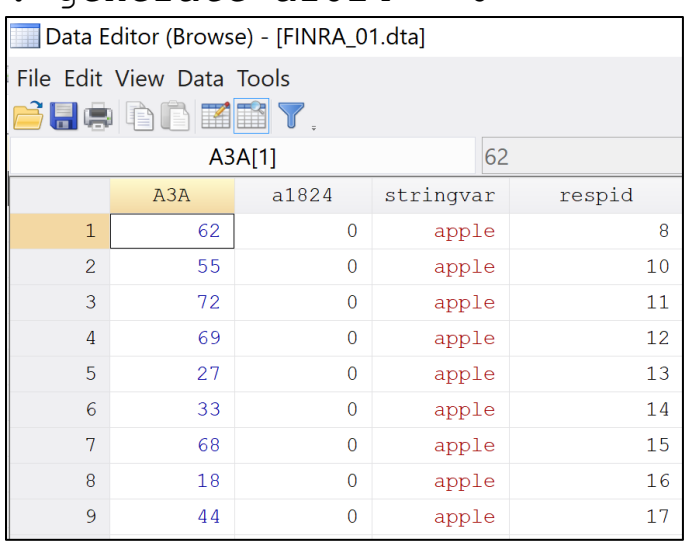
```
. list stringvar respid stateq censusreg sloan sl_concern ed_lths in 1/10

     +----------------------------------------------------------------+
     | string~r   respid     stateq   census~g   sloan   sl_con~n   ed_lths |
     |----------------------------------------------------------------|
  1. |    apple        8   Minnesot    Midwest       0          .         0 |
  2. |    apple       10    Florida      South       0          .         0 |
  3. |    apple       11   Michigan    Midwest       0          .         0 |
  4. |    apple       12   Illinois    Midwest       0          .         0 |
  5. |    apple       13      Texas      South       1          1         0 |
     |----------------------------------------------------------------|
  6. |    apple       14   Mississi      South       0          .         0 |
  7. |    apple       15   New Jers   Northeas       0          .         0 |
  8. |    apple       16   Massachu   Northeas       1          0         0 |
  9. |    apple       17   Californ       West       0          .         0 |
 10. |    apple       18   Arkansas      South       0          .         0 |
     +----------------------------------------------------------------+
```

How can I add or change variables?

So far, we've only looked at the variables already in the dataset. However, data rarely come perfectly. We often want to create new variables based on the variables in the dataset. It's easy to create new variables (columns) with whatever value you would like to assign, based on the values of one or more existing variables, or more complex expressions as well as to update values. There are two main commands here:

1. **`generate`**: Create new variables with the `generate` command, a new variable name, and assign it (=) to some initial value. Command format:
   `generate` *`varname`* `= value`

   Create a new binary variable called a1824 indicating respondents ages 18-24:
   ```
   . generate a1824 = 0
   ```



	A3A	a1824	stringvar	respid
1	62	0	apple	8
2	55	0	apple	10
3	72	0	apple	11
4	69	0	apple	12
5	27	0	apple	13
6	33	0	apple	14
7	68	0	apple	15
8	18	0	apple	16
9	44	0	apple	17

2. `replace`: The **`replace`** command will update the value(s) of records for an existing variable and has similar syntax to `generate: replace varname = newvalue`. It is often combined with `if` or `in` to update the values of only a subset of records:
   ```
   . replace a1824 = 1 if A3A >= 18 & A3A < 25
   (2,581 real changes made)
   ```

Data Editor (Browse) - [FINRA_01.dta]

File Edit View Data Tools

a1824[1] 0

	A3A	a1824	stringvar	respid
1	62	0	apple	8
2	55	0	apple	10
3	72	0	apple	11
4	69	0	apple	12
5	27	0	apple	13
6	33	0	apple	14
7	68	0	apple	15
8	18	1	apple	16
9	44	0	apple	17

3. When you generate or replace variables, confirm whether they were created as expected by crosstabbing vs. other (original) variable(s) or summarizing.

```
. summarize A3A if a1824 == 0

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
         A3A |     22,928    49.91787    14.25653         25        101

. summarize A3A if a1824 == 1

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
         A3A |      2,581    21.13754    2.006788         18         24
```

****Most mistakes are human errors, and most of these are simple typos. Checking that the new variables you created have the correct range (e.g. there are no negative age values) and "look right" can save you a lot of time and trouble in the long run.*****

4. You can also create categorical variables:

```
. gen age_cat = .
(25,509 missing values generated)

. replace age_cat = 1 if  A3A > 17 & A3A < 25
(2,581 real changes made)

. replace age_cat = 2 if A3A > 24 & A3A < 61
(16,843 real changes made)

. replace age_cat = 3 if A3A > 60
(6,085 real changes made)
```

```
. tab A3A age_cat , m

                 |                 age_cat
What is your age? |         1          2          3      Total
------------------+---------------------------------------------
               18 |       374          0          0        374
               19 |       294          0          0        294
               20 |       322          0          0        322
               21 |       395          0          0        395
               22 |       408          0          0        408
               23 |       385          0          0        385
               24 |       403          0          0        403
               25 |         0        408          0        408
               26 |         0        361          0        361
               27 |         0        406          0        406
               28 |         0        380          0        380
```

5. A variable whose value is a transformation of the value of another variable. Create age in months from age in years:

```
. gen age_in_months = A3A*12

. sum age_in_months A3A

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
age_in_mon~s |     25,509    564.0706    192.9061        216       1212
         A3A |     25,509    47.00588    16.07551         18        101
```

6. Variables based on more than one other variable. Below we create a general has bank account dummy variable based on separate checking and savings account dummies:

```
. gen bankacct = .
(25,509 missing values generated)

. replace bankacct = 1 if B1 == 1
(22,948 real changes made)

. replace bankacct = 1 if B2 == 1
(598 real changes made)

. replace bankacct = 0 if B1 == 2 & B2 == 2
(1,558 real changes made)
```

```
. tab bankacct B1 if B2 != 1, m

           |      Do you [Does your household] have a
           |               checking account?
  bankacct |       Yes         No  Don't kno  Prefer no |     Total
-----------+--------------------------------------------+----------
         0 |         0     1,558          0          0 |     1,558
         1 |     4,522         0          0          0 |     4,522
         . |         0        20         95        290 |       405
-----------+--------------------------------------------+----------
     Total |     4,522     1,578         95        290 |     6,485

. tab bankacct B2 if B1 != 1, m

           |   Do you [Does your household] have a savings
           |      account, money market account, or CD
  bankacct |       Yes         No  Don't kno  Prefer no |     Total
-----------+--------------------------------------------+----------
         0 |         0     1,558          0          0 |     1,558
         1 |       598         0          0          0 |       598
         . |         0        65         90        250 |       405
-----------+--------------------------------------------+----------
     Total |       598     1,623         90        250 |     2,561
```

Per the above example: it is often best practice to start by setting a new variable to missing so that missing (.), the highest value, and other special values are not accidentally coded to a valid value.

A word on variable names

Good variable names are concise, yet descriptive.

Bad name	Reason it's bad	Better name
`A2BSUS`	Not descriptive and hard to remember	`edu_cat`
`ckorsavebankaccountnumber`	Too long	`bankacct`
`YearsAlive_2018`	Roundabout way of saying age; mixes upper and lower case letters, which is annoying to type every time	`age`

How do I save my work?

Now that you've added the variables you want, you want to save your dataset so that you don't have to recreate the variables each time you want to analyze the data. To save a Stata dataset, type:

```
save "Finra_02.dta", replace
```

This will save whatever is in the memory (you can check `browse` to see). Be sure not to save it as a new name so you don't overwrite the original data. You can also save other types of files, which we'll get to later in a later session.

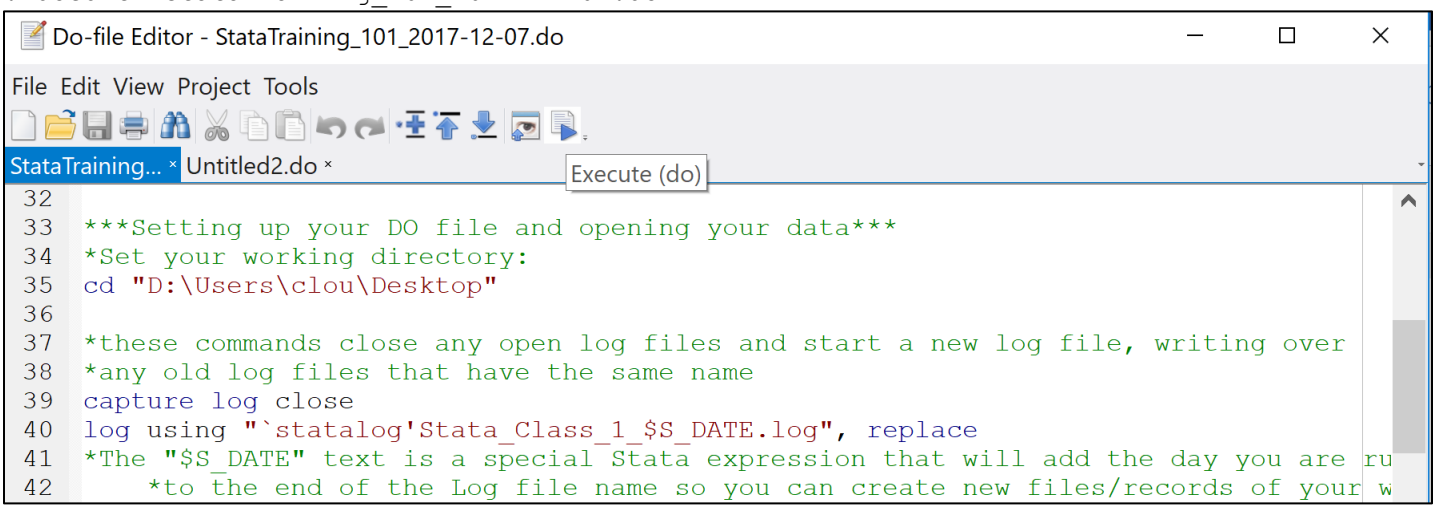
I can do all of this in Excel. Why shouldn't I?

Putting what you've just learned into a script will allow you to save, record, and replicate your work. The biggest advantage of using Stata or a similar statistical programming language— even more than statistical modeling, I think— is to allow you or others to easily save work, record results, and reproduce or modify an analysis.

Goal: set up a do file that does everything you need to do, run it, and examine the output.

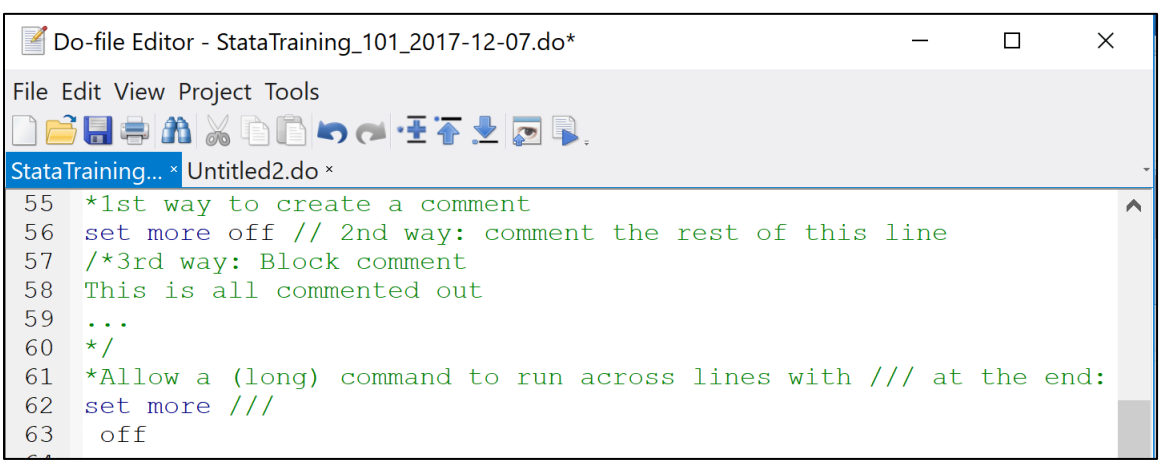
1. When you move all the commands from the command line to Stata scripts called `do` files (text documents containing a series of commands) you can modify, save, and run through your entire program without typing in each line.

```
. doedit "StataTraining_101_2017-12-07.do"
```



Run commands in `do` file by clicking the <u>Execute (do)</u> button that looks like a paper with a play sign (can run the whole thing or just selected lines by highlighting them) **or by using the `do` command**. You should concentrate on using `do` files going forward as they allow you to save and reproduce your analysis; the one above will run through this entire training and more supplementary material on top of it.

- **Your `do` file code should include comments (the text in `green`) which will help guide you the next time you work on a project or someone new to the project or taking over your work.** Specify comments with a single star (`*`) at the beginning of a line, double forward slash (`//`) to comment out the rest of a line, or `/*  */` for a block that will comment out everything between the stars and can go across one or more lines.
    - Stata commands usually have to live a single line, but you can use block comments or triple-slash (`///`) at the end of a line to continue a command to the next line.



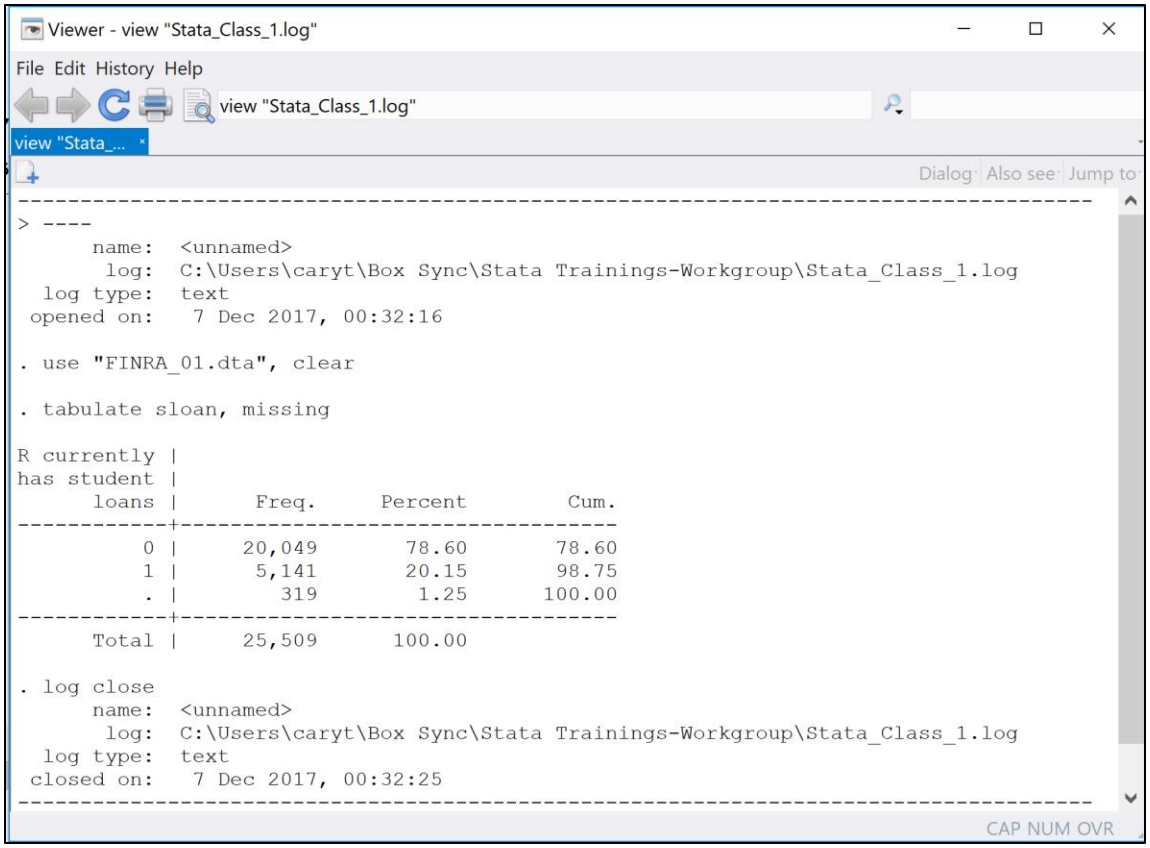
How do I keep track of everything that happens in my do file?

You've set up your do-file with all your commands (your code). You run your commands. How do you check what's happening? How can you present it to someone without them having to open and run the program?

Start a `log` file at the beginning of your `do` file. The `log` file will capture whatever appears in the main results window (both the commands and their output) until you close it in a separate file under the name you specify providing a record of your work.

```
. log using "Stata_Class_1.log", replace
-------------------------------------------------------------------------------
      name:  <unnamed>
       log:  C:\Users\caryt\Box Sync\Stata Trainings-Workgroup\Stata_Class_1.log
  log type:  text
 opened on:   7 Dec 2017, 00:32:16

. use "FINRA_01.dta", clear

. tabulate sloan, missing

R currently |
has student |
      loans |      Freq.     Percent        Cum.
------------+-----------------------------------
          0 |     20,049       78.60       78.60
          1 |      5,141       20.15       98.75
          . |        319        1.25      100.00
------------+-----------------------------------
      Total |     25,509      100.00

. log close
      name:  <unnamed>
       log:  C:\Users\caryt\Box Sync\Stata Trainings-Workgroup\Stata_Class_1.log
  log type:  text
 closed on:   7 Dec 2017, 00:32:25
-------------------------------------------------------------------------------
```

(output)



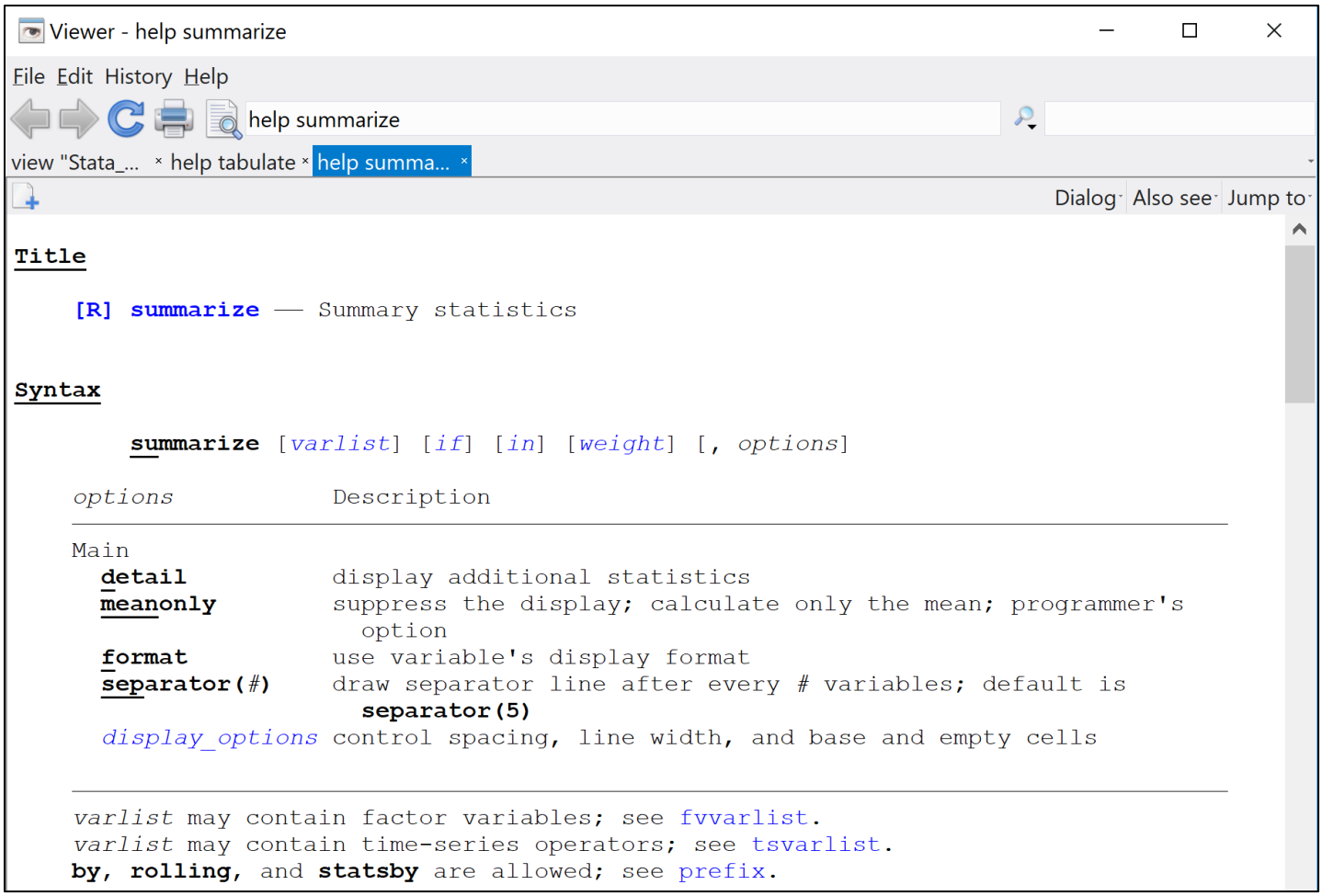
(captured in `log`)

Generally run your entire `do` file through once the analysis setup is final to create a "clean" `log` file. It is also best practice to save a new version of your data under a different file name, often at the beginning or end of your program, so that you do not accidentally overwrite your original data source.

What if I run into errors or want to learn a new command?

Help files can teach you more about basic and more advanced Stata commands and how to use them. Once you understand the syntax and setup of a help file, you can learn almost any Stata command or concept:

```
. help summarize
```




```
Title

    [R] summarize -- Summary statistics


Syntax

        summarize [varlist] [if] [in] [weight] [, options]

    options            Description
    ---------------------------------------------------------------------------
    Main
      detail           display additional statistics
      meanonly         suppress the display; calculate only the mean; programmer's
                         option
      format           use variable's display format
      separator(#)     draw separator line after every # variables; default is
                         separator(5)
      display_options  control spacing, line width, and base and empty cells

    ---------------------------------------------------------------------------
    varlist may contain factor variables; see fvvarlist.
    varlist may contain time-series operators; see tsvarlist.
    by, rolling, and statsby are allowed; see prefix.
```

There's much more you can "do" with Stata including more advanced data cleaning as well as manipulating your dataset by merging with other data, reshaping, etc. There is more next week on these more advanced operations.

- In the meantime, play around with this and your own `do` file and try the exercises at the end on your own without looking at solutions.
- Printouts of the `do` and `log` files from this training are on the following pages.

```
** LOCATION: D:\Users\clou\Desktop\Do
** CREATED BY: Emma Kalish
** CREATED ON: 7/20/15
** LAST EDITED: 6/29/18 by Hannah Hassani
** LAST RUN:
** DESCRIPTION: Example do file for Stata class
** NOTES: Uses Stata15
*****************************************************************************

*Review Stata interface/windows
	*Results (main) window: shows the commands that are run and the resulting output (errors show up in red text)
	*Variables window: shows variables in current dataset including any labels
	*Properties window: detailed characteristics of dataset and its variables as well as variable(s) selected in the Variables window
	*Review window: shows previous commands entered and if they resulted in an error (if text is in red)
	*Command window: allows users to type in commands to be executed directly/interactively

*Basic structure of command -> [commandname][what (e.g., variable(s), file, etc.], [options]

*Although you can run commands by typing them into the command window and using the dropdown menus,
*The real power of Stata lies in using it as a statistical programming language.
*That is creating scripts/programs in the form of DO files that allow you to save and reproduce your analysis.

*The purpose of using DO/Log files = recording and replicating your work (you can also steal from old DO files for new anlayses)
*To this end, create new versions of DO, LOG, and DATA files rather than saving over old ones.

**3 Main Types of Stata Files:
*Data files (end in .dta)  look like spreadsheets and contain the information you want to analyze
*DO files (end in .do) are essentially Stata programs that allow you to save and re-run/reproduce your analysis from scratch
*LOG files (end in .log [unformatted and can open with any text editor] or .smcl [formatted, but can only open with Stata])
	*capture the results (what appears in the main results window) of your commands/DO file  and contain a record of the steps taken in your analysis.


***Setting up your DO file and opening your data***
*Set your working directory:
cd "D:\Users\hhassani\Desktop"

*This command allows do file to run continuously rathering than having to click "more" on the screen
set more off, permanently

**Commenting your code
*Your DO file should contain comments to document your work allowing others to follow your work and
*reminding yourself  of what you were doing later. There are a few ways to create comments,
*you can start a line with an * (star/asterix) to make the line a comment.
*You can also follow a command with a // (double forward slash) to make the REST of the line a comment
*To create a multi-line comment block start with /* and end with */
* /// (three forward slashes allow you to continue a command across multiple lines

*1st way to create a comment
set more off // 2nd way: comment the rest of this line
/*3rd way: Block comment
This is all commented out
...
*/
*Allow a (long) command to run across lines with /// at the end:
```

```
set more ///
 off

*these commands close any open log files (capture log close) and
*start a new log file (log using) to capture your output and results,
*the replace option (options always follow a comma) writes over
*any old log files that have the same name in your working directory
capture log close
log using "Stata_Class_1.log", replace


***Loading in your data***
*1) Copy and paste data from another program into the data editor or manually enter it:
edit
*2) Use the import command or wizard to directly bring in data from a file in another format
import excel "FINRA_01.xls", sheet("Sheet1") clear
*3) load the data you want to use with the Stata "use" command
      *add clear as an option at the end after a comma to empty any data that was in before
use "FINRA_01.dta", clear
* This is a file containing survey data on individuals background and financial situation


***Getting to know your data***
*Inspect/get a detailed look at your data using the data editor in browse mode:
browse
      *rows are observations/records; columns are variables/characteristics/features
      *Red data is coded as string, black is numeric, and blue is numeric with text labels.

*We can see this by using the 'display' command to turn Stata into a calculator:
*Adding 2+2 with numeric values
display 2+2
*Adding 'stringvar'+"2" with string values
display stringvar +"2"
*Show the value of the 'stateq' variable (will show the value of the 1st record)
display stateq

*Describe will provide basic information on your data set and its variables:
describe
*Codebook provides more details on specific variables including missingness, range, example values or distribution
codebook stringvar respid stateq censusreg sloan sl_concern ed_lths
*List will print out values for the variables and records/observations specified
list stringvar respid stateq censusreg sloan sl_concern ed_lths in 1/10


***Descriptive statistics***
*You may want to examine variables of interest for your analysis more closely
*or include descriptive statistics for them in your study

*Use summarize for discrete or continuous numeric variables,
*tabulate for ordinal or categorical variables,
*and either for dummies/binary/indicators:

*summarize the age variable
summarize A3A
*or we can summarize more than one variable at a time
*(age and whether observation is white):
```

```
summarize A3A  r_white
*tabulate education category variable
tabulate ed_catvar
*tabulate student loan recipiency variable with the missing option (, missing)
	*at the end of the command after a comma to show any missing values
	*(coded as . for numeric data and "" for string data)
tabulate sloan, missing
*You usually don't have to type out the whole expression,
*Stata will know what you mean if you abbreviate as long as
*there is no ambiguity with other commands, variables, options, etc.
tab sloan, m
*Another option: see a labeled numeric variable without its value labels
	*(i.e. see the underlying numeric values)
tab B1
tab B1, nolabel
*Also, use tabulate with two categorical variables to show their crosstab:
tab ed_catvar sloan , missing
tab ed_catvar sloan, column //the column option reports the % within each row that are in each column category (%s in columns sum to 100%)
tab ed_catvar sloan, row //the row option reports the % within each column that are in each row category (%s in rows sum to 100%)
tab ed_catvar sloan, cell //the cell option reports the % in the entire table total that are in each cell (%s in cells sum to 100%)

*another way to look at your data - graphs
*Histogram showing the distribution of age:
histogram A3A


***Subsetting your data***
*IF and IN statements allow you to operate on subsets of your data
*IN statements define subsets based on records' index (observation) number
*IF statements define subsets based on conditional statements
	*& is AND
	*| is OR
	*Use == to compare the equality of two values
	* != is not equal to (! is NOT in general)
	* > is greater than
	* < is less than
	* >= is greater than or equal to (= must come after < or >, not before or it will not work, i.e. >= is CORRECT; => is INCORRECT)
	* <= is less than or equal to
*Summarize age for just observations less than age 50:
summarize A3A  if A3A < 50
*Tabulate education for just observations less than age 50:
tabulate  ed_catvar  if A3A < 50
*or just those whose age is equal to 50:
tabulate  ed_catvar  if A3A == 50

*We already used an 'in' expression with 'list' above to show the values of
*some of our variables for the first ten observations:
list stringvar respid stateq censusreg sloan sl_concern ed_lths in 1/10


***Creating new variables and updating existing variables***
*Be mindful of missing ("" if string or . if numeric ) values as well as special values codes
*Special values are often negative or high values like 9998, 9999, etc.
```

```
*and can indicate "don't know," "refused," etc. in survey data.

*always inspect your data initially via tab, summ, etc. to look for these and deal with them appropriately
*BEFORE constructing variables or starting your actual analysis

*binary (0/1) age variable
*The 'generate' creates a new variable with the name specified and set to the value after the equals sign
generate a1824 = 0
*The 'replace' command updates the values of an existing variable;
      *often you'll combine it with if statements to change the values of just a subset of observations
replace a1824 = 1 if A3A >= 18 & A3A < 25
*look at your variable after you make it
tab a1824, m
*And compare it to the original
summarize A3A if a1824 == 0
summarize A3A if a1824 == 1
*Finally, label your variable
label variable a1824 "age between 18 and 24"

*You can also create categorical variables
gen age_cat = .
replace age_cat = 1 if  A3A > 17 & A3A < 25
replace age_cat = 2 if A3A > 24 & A3A < 61
replace age_cat = 3 if A3A > 60
*label your variable
label variable age_cat "age categories"
*label the values of your variable
label define age 1 "18-24" 2 "25-60" 3 "more than 60"
label values age_cat age
tab age_cat, m
*Confirm that you created variable correctly by crosstabbing vs. original variable(s)
tab A3A age_cat , m

**Other kinds of variables to create
*Scaling/transformations
*Create an age in months variable based on the age in years:
gen age_in_months = A3A*12
sum age_in_months A3A
*Create age-squared
gen age_squared = A3A*A3A
sum age_squared A3A
*Create logged-age
gen age_logged = ln(A3A)
sum age_logged A3A

*Create a new variable based on the value of multiple other variabls:
*Create a new dummy variable based on a few other dummies rather than just one
*B1 = checking acct; B2 = savings acct
gen bankacct = .
replace bankacct = 1 if B1 == 1
replace bankacct = 1 if B2 == 1
replace bankacct = 0 if B1 == 2 & B2 == 2
*could also have used an OR statement instead of an AND statement - depends on how you want to define things
replace bankacct = 0 if (B1 == 2 | B2 == 2) & bankacct ==.
*Confirm that you created variable correctly by crosstabbing vs. original variable(s)
tab bankacct B1 if B2 != 1, m
```

```
tab bankacct B2 if B1 != 1, m

*Interaction variable: multiple the values of the female indicator and age
	*to create a variable that captures females age but is 0 for males
gen female_age = g_female*A3A
*Compare the original and new variable for females and non-females:
sum female_age A3A if g_female == 1
sum female_age A3A if g_female == 0


***Stata help: once you can use a Stata help file, you should be able to figure out almost any command!
help summarize
*Basic syntax of a Stata command:
*commandname expression if/in expression , options
*The 1st expression can contain variable names, assignement clauses, subcommands, etc. and depend on the particular command
*The if/in statement is followed by a 2nd expression defining the subset of the data set you want the command to work on
*Options always follow a single comma and are also command specific/dependent.
*Reference the help file for more on options, syntax, etc. for specific commands

*More on syntax is available here: http://www.stata.com/manuals13/gsw10.pdf

*A list of basic Stata commands is available at:
* http://www.stata.com/manuals13/u27.pdf
* and
* https://people.ucsc.edu/~aspearot/Econ113W13%20/basic_tutorial_stata.pdf


*always save with a new name, do not overwrite your data.
save "FINRA_02.dta", replace
log close


*************
**EXERCISES**
*************
*1. Start a separate, new log file and open up the original FINRA_01 data set

*Start new Log file
capture log close
log using "Stata_Class_1_EXERCISES_$S_DATE.log", replace
*The "$S_DATE" text is a special Stata expression that will add the day you are running the program
	*to the end of the Log file name so you can create new files/records of your work automatically every day.

*Open base data set
use "FINRA_01.dta", clear

*2. Provide descriptive statistics of variable G22.
	*How many and what percentage of records have the value "Don't know", "Prefer not to say", and missing?
	*How are "Don't know" and "Prefer not to say" coded in the data?

*Determine what type of variable G22 is (dummy/categorical/continous)
codebook G22
*Show descriptive statistics of G22 using tabulate since it looks to be categorical
	*(use summarize to describe continous variables usually; could use either command for dummies)
tab G22, m //don't forget the missing option to show what % of all observations have a missing value for this variable: Share
```

```
"Don't know" = 0.93% , Share "Prefer not to say" = 0.05% , and Share missing (.) = 79.85%
*Add the "nolabel" option to see how "Don't know" and "Prefer not to say" are coded numerically
tab G22, m nolabel //"Don't know" is coded as 98; "Prefer not to say" is coded as 99


*3. Create a new version of this variable called G22_clean that recodes "Don't know" and "Prefer not to say" to missing
      *Crosstab the new and old versions of the variable so that you can confirm you created it correctly.

*Start by setting the new variable to missing so that "Don't know" and "Prefer not to say" are recoded to missing automatically
gen G22_clean = .
*Then update the values of the new variable using replace  to the value of the old variable only when they are "valid"
replace G22_clean = 1 if G22 == 1
replace G22_clean = 2 if G22 == 2
*I can also create labels to describe the new variable and its new values
*label the variable
label var G22_clean "Clean version of G22"
*label its values
label define G22_clean_label 1 "Yes" 2 "No"
label value  G22_clean  G22_clean_label
*Finally check the new vs. old variable using tabulate to confirm it was created correctly
tab G22 G22_clean ,m // looks good


*4. What is the average number of dependent children (depchild)? What is the 25th percentile? 75th percentile?

*You can get "standard" descriptive statistic percentiles by adding the detail option to the summarize command:
summ depchild, d //the 25th %tile is 0; the 75th %tile is 1.


*5. Use HELP to figure out how to use the "centile" command to produce the 20th, 40th, 60th, and 80th percentile
      *for the "wgt_n2" variable.

*Pull up the Stata help file
help centile
*Use centile to get the 20th, 40th, 60th, and 80th percentile of "wgt_n2" since summarize, detail does not provide these
centile wgt_n2, centile(20 40 60 80) //the syntax for centile is a little tricky as the option needed to specify the specific
percentile cuts to show repeats the command name
*The 20th %tile is .4376673; the 40th %tile is .6453935; 60th %tile is 1.083546; 80th %tile is 1.534317


*6. Create a new categorical version of the weight variable called "wgt_n2_quintile" that contains information on
      *which quintile each record's weight "wgt_n2" is in using the results of the centile command from question 5.

*Create this new variable and set to missing initially
gen wgt_n2_quintile = .
*Update the value with the percentile number; make sure the ranges you use in the "if" statements reflect what you really
want and do not overlap
replace wgt_n2_quintile = 1 if wgt_n2 < .4376673
replace wgt_n2_quintile = 2 if wgt_n2 >=  .4376673 & wgt_n2 < .6453935
replace wgt_n2_quintile = 3 if wgt_n2 >=  .6453935  & wgt_n2 < 1.083546
replace wgt_n2_quintile = 4 if wgt_n2 >=  1.083546 & wgt_n2 < 1.534317
replace wgt_n2_quintile = 5 if wgt_n2 >=  1.534317 & wgt_n2 < . // Missing (.) is the highest numeric value in Stata,
                                                                                    *so specifying that the variable range should be
less than missing here
                                                                                    *will make sure that if any missing values exist,
                                                                                    *they will not get accidentally coded into the
```

```
5th quintile (we only want to count valid values)
*Tab to desribe this new variable
tab wgt_n2_quintile, m
*Confirm it was created correctly by summarizing the original variable by their value in the the new version fo the variable
summ wgt_n2 if wgt_n2_quintile == 1
summ wgt_n2 if wgt_n2_quintile == 2
summ wgt_n2 if wgt_n2_quintile == 3
summ wgt_n2 if wgt_n2_quintile == 4
summ wgt_n2 if wgt_n2_quintile == 5
    *The min and max value of the original variable for each group indicate that the quintile variable was created correctly

*7. Save a new version of the data file called FINRA_03.dta,
    *close your log,
    *and then inspect your log by navigating to where you saved it and opening it with notepad.

*save new version of the data
save "FINRA_03.dta", replace
*close log
log close
*view log by navigating to it and opening it with Stata or notepad.
    *Mine is in my working directory "D:\Users\hhassani\Desktop"
```

```
-------------------------------------------------------------------------------------------------------------------------------------
      name:  <unnamed>
       log:  D:\Users\hhassani\Desktop\Stata_Class_1.log
  log type:  text
 opened on:  29 Jun 2018, 09:59:02

.
.
. ***Loading in your data***
. *1) Copy and paste data from another program into the data editor or manually enter it:
. edit

. *2) Use the import command or wizard to directly bring in data from a file in another
format
. import excel "FINRA_01.xls", sheet("Sheet1") clear

. *3) load the data you want to use with the Stata "use" command
.         *add clear as an option at the end after a comma to empty any data that was in
before
. use "FINRA_01.dta", clear

. * This is a file containing survey data on individuals background and financial situation
.
.
. ***Getting to know your data***
. *Inspect/get a detailed look at your data using the data editor in browse mode:
. browse

.         *rows are observations/records; columns are variables/characteristics/features
.         *Red data is coded as string, black is numeric, and blue is numeric with text
labels.
.
. *We can see this by using the 'display' command to turn Stata into a calculator:
. *Adding 2+2 with numeric values
. display 2+2
4

. *Adding 'stringvar'+"2" with string values
. display stringvar +"2"
apple2

. *Show the value of the 'stateq' variable (will show the value of the 1st record)
. display stateq
24

.
. *Describe will provide basic information on your data set and its variables:
. describe

Contains data from FINRA_01.dta
  obs:        25,509
 vars:           115                          6 Dec 2017 12:13
 size:     7,907,790
-------------------------------------------------------------------------------------------------------------------------------------
              storage   display    value
variable name   type    format     label      variable label
-------------------------------------------------------------------------------------------------------------------------------------
stringvar       str5    %9s                   Example of a string variable
respid          long    %12.0g                Respondent ID
stateq          byte    %8.0g      STATEQ     state
censusreg       byte    %8.0g      CENSUSRE   census region
sloan           float   %9.0g                 R currently has student loans
sl_concern      float   %9.0g                 R concerned that s/he cannot pay back student
loans
ed_lths         float   %9.0g                 Education is less than High School
ed_hs           float   %9.0g                 Education is High School or equivalent
ed_somecoll     float   %9.0g                 Education is some college
```

```
ed_coll         float   %9.0g                 Education is a college degree
ed_postcoll     float   %9.0g                 Education is a post college degree
ed_al_somecoll  float   %9.0g                 At least some college
ed_catvar       float   %25.0g     education

ed_lteqhs       float   %9.0g                 Education is High School, Equivalent or less
ed2_catvar      float   %19.0g     education2

a_2029          float   %9.0g                 Between ages of 20 and 29
a_3039          float   %9.0g                 Between ages of 30 and 39
a_4049          float   %9.0g                 Between ages of 40 and 49
a_5059          float   %9.0g                 Between ages of 50 and 59
a_60plus        float   %9.0g                 Age 60 or older
a_catvar        float   %12.0g     agegrp
r_white         float   %9.0g                 White, non-Hispanic
r_black         float   %9.0g                 Black, non-Hispanic
r_hisp          float   %9.0g                 Hispanic, any race
r_asian         float   %9.0g                 Asian, non-Hispanic
r_other         float   %9.0g                 Native American or Other, non-Hispanic
reg_ne          float   %9.0g                 Northeast Census Region
reg_mw          float   %9.0g                 Midwest Census Region
reg_south       float   %9.0g                 South Census Region
reg_west        float   %9.0g                 West Census Region
g_male          float   %9.0g                 Male
g_female        float   %9.0g                 Female
i_group1        byte    %8.0g                 Less than $15,000
i_group2        byte    %8.0g                 At least $15,000 but less than $25,000
i_group3        byte    %8.0g                 At least $25,000 but less than $35,000
i_group4        byte    %8.0g                 At least $35,000 but less than $50,000
i_group5        byte    %8.0g                 At least $50,000 but less than $75,000
i_group6        byte    %8.0g                 At least $75,000 but less than $100,000
i_group7        byte    %8.0g                 At least $100,000
i_catvar        float   %11.0g     inc        Income Categories
i2_group1       float   %9.0g                 Less than $25,000
i2_group2       float   %9.0g                 At least $25,000 but less than $50,000
i2_group3       float   %9.0g                 At least $50,000 but less than $100,000
i2_group4       float   %9.0g                 At least $100,000
i2_catvar       float   %17.0g     inc2       Alt Income Categories
la_marr         float   %9.0g                 Married
la_cohab        float   %9.0g                 Cohabiting
la_nomarr       float   %9.0g                 Never married, not cohabiting
la_separate     float   %9.0g                 Separated, divorced, widowed; not cohabiting
la_catvar       float   %44.0g     larrg
depchild        float   %9.0g                 Number of dependent children
dc_nokid        float   %9.0g                 One Dep Children
dc_1kid         float   %9.0g
dc_2kid         float   %9.0g                 Two Dep Children
dc_3kid         float   %9.0g                 Three Dep Children
dc_4kid         float   %9.0g                 4 or more Dep Children
dc_1or2kid      float   %9.0g                 One or Two Dep Children
dc_3morekid     float   %9.0g                 Three or more Dep Children
dc_anykid       float   %9.0g                 Has Dep Children
dc_catvar       float   %22.0g     dc1
dc2_catvar      float   %26.0g     dc2
dc3_catvar      float   %16.0g     dc3
emp_self        float   %9.0g                 Respondent is Self Employed
emp_full        float   %9.0g                 Respondent is Employed Full time
emp_part        float   %9.0g                 Respondent is Employed Part time
emp_notLF       float   %9.0g                 Respondent is Not in Labor Force
emp_sick        float   %9.0g                 Respondent is Disabled/Sick
emp_unemp       float   %9.0g                 Respondent is Unemployed
emp_catvar      float   %18.0g     empstat
wgt_n2          double  %10.0g                National weight by age/gen, eth, ed, censusdiv
A3              byte    %8.0g      A3         What is your gender?
A3A             int     %8.0g      A3A        What is your age?
A4A             byte    %8.0g      A4A        Ethnicity
A5              byte    %8.0g      A5         What was the last year of education that you
completed?
A6              byte    %8.0g      A6         What is your marital status?
A7              byte    %8.0g      A7         Which of the following describes your current
```

```
living arrangements?
A11             byte    %8.0g      A11      * How many children do you have who are
financially dependent on you [or your spou
A8              byte    %8.0g      A8       * What is your [household's] approximate annual
income, including wages, tips, inv
A9              byte    %8.0g      LABA       Which of the following best describes your
current employment or work status?
A10             byte    %8.0g      LABA     * Which of the following best describes your
[spouse's/partner's] current employme
A21             byte    %8.0g      LABB       Are you a part-time student taking courses for
credit?
A22             byte    %8.0g      A22        Which of the following best describes the
school you are attending?
J1              byte    %8.0g      J1       * Overall, thinking of your assets, debts and
savings, how satisfied are you with
J4              byte    %8.0g      J4       * In a typical month, how difficult is it for you
to cover your expenses and pay a
J5              byte    %8.0g      LABB     * Have you set aside emergency or rainy day funds
that would cover your expenses f
J20             byte    %8.0g      J20      * How confident are you that you could come up
with $2,000 if an unexpected need a
B1              byte    %8.0g      LABB       Do you [Does your household] have a checking
account?
B2              byte    %8.0g      LABB     * Do you [Does your household] have a savings
account, money market account, or CD
B4              byte    %8.0g      LABB       Do you [or your spouse/partner] overdraw your
checking account occasionally?
B14             byte    %8.0g      LABB     * Not including retirement accounts, do you [does
your household] have any investm
C1              byte    %8.0g      LABB     * Do you [or your spouse/partner] have any
retirement plans through a current or p
C4              byte    %8.0g      LABB     * Do you [or your spouse/partner] have any other
retirement accounts NOT through a
C11             byte    %8.0g      LABB     * In the last 12 months, have you [or your
spouse/partner] taken a hardship withdr
D20_1           byte    %8.0g      LABB     * Over the past 12 months, did you [your
household] receive any of the following t
D20_5           byte    %8.0g      LABB     * Over the past 12 months, did you [your
household] receive any of the following t
D20_6           byte    %8.0g      LABB     * Over the past 12 months, did you [your
household] receive any of the following t
EA_1            byte    %8.0g      LABB       Do you [or your spouse/partner] currently own
any of the following? - Your home
EA_2            byte    %8.0g      LABB     * Do you [or your spouse/partner] currently own
any of the following? - Other real
E7              byte    %8.0g      LABB       Do you currently have any mortgages on your
home?
E8              byte    %8.0g      LABB       Do you have any home equity loans?
E15             byte    %8.0g      E15      * How many times have you been late with your
mortgage payments in the last 2 year
E16             byte    %8.0g      LABB     * Have you been involved in a foreclosure process
on your home in the last 2 years
F2_1            byte    %8.0g      LABB     * In the past 12 months, which of the following
describes your experience with cre
F2_3            byte    %8.0g      LABB     * In the past 12 months, which of the following
describes your experience with cre
F2_4            byte    %8.0g      LABB     * In the past 12 months, which of the following
describes your experience with cre
F2_5            byte    %8.0g      LABB     * In the past 12 months, which of the following
describes your experience with cre
F2_6            byte    %8.0g      LABB     * In the past 12 months, which of the following
describes your experience with cre
G21             byte    %8.0g      LABB       Do you currently have any student loans?
G22             byte    %8.0g      LABB       Are you concerned that you might not be able to
pay off your student loans?
G4              byte    %8.0g      LABB       Have you declared bankruptcy in the last two
years?
G5_1            byte    %8.0g      LABD     * In the past 5 years, how many times have you… -
Taken out an auto title loan? Au
G5_2            byte    %8.0g      LABD     * In the past 5 years, how many times have you… -
```

```
Taken out a short term 'payday'
G23             byte    %8.0g      LABE     * How strongly do you agree or disagree with the
following statement? - I have too
probpop         float   %9.0g                 Problematic Population; Older than 25, Some
coll no BA
probpop2        float   %9.0g                 Problematic Population 2; Ages 25-40, Some coll
no BA
                                             * indicated variables have notes
-------------------------------------------------------------------------------------------
-------------------------------------------------------
Sorted by:

. *Codebook provides more details on specific variables including missingness, range, example
values or distribution
. codebook stringvar respid stateq censusreg sloan sl_concern ed_lths

-------------------------------------------------------------------------------------------
-------------------------------------------------------
stringvar
                          Example of a string variable
-------------------------------------------------------------------------------------------
-------------------------------------------------------

                  type:  string (str5)

         unique values:  1                        missing "":  0/25,509

            tabulation:  Freq.  Value
                        25,509  "apple"

-------------------------------------------------------------------------------------------
-------------------------------------------------------
respid
                                        Respondent ID
-------------------------------------------------------------------------------------------
-------------------------------------------------------

                  type:  numeric (long)

                 range:  [8,75001]                    units:  1
         unique values:  25,509                   missing .:  0/25,509

                  mean:   30698.5
             std. dev:   21087.2

           percentiles:        10%       25%       50%       75%       90%
                              4034     12808     27066     48130     62813

-------------------------------------------------------------------------------------------
-------------------------------------------------------
stateq
                                                 state
-------------------------------------------------------------------------------------------
-------------------------------------------------------

                  type:  numeric (byte)
                 label:  STATEQ

                 range:  [1,51]                       units:  1
         unique values:  51                       missing .:  0/25,509

              examples:  11    Georgia
                         21    Maryland
                         31    New Jersey
                         41    South Carolina

-------------------------------------------------------------------------------------------
-------------------------------------------------------
censusreg
                                        census region
```

```
-------------------------------------------------------------------------------------------
-------------------------------------------------------

                  type:  numeric (byte)
                 label:  CENSUSRE

                 range:  [1,4]                       units:  1
         unique values:  4                        missing .:  0/25,509

            tabulation:  Freq.   Numeric  Label
                         4,501         1  Northeast
                         6,004         2  Midwest
                         8,501         3  South
                         6,503         4  West

-------------------------------------------------------------------------------------------
-------------------------------------------------------
sloan
                         R currently has student loans
-------------------------------------------------------------------------------------------
-------------------------------------------------------

                  type:  numeric (float)

                 range:  [0,1]                       units:  1
         unique values:  2                        missing .:  319/25,509

            tabulation:  Freq.  Value
                        20,049  0
                         5,141  1
                           319  .

-------------------------------------------------------------------------------------------
-------------------------------------------------------
sl_concern
   R concerned that s/he cannot pay back student loans
-------------------------------------------------------------------------------------------
-------------------------------------------------------

                  type:  numeric (float)

                 range:  [0,1]                       units:  1
         unique values:  2                        missing .:  20,619/25,509

            tabulation:  Freq.  Value
                         2,145  0
                         2,745  1
                        20,619  .

-------------------------------------------------------------------------------------------
-------------------------------------------------------
ed_lths
                    Education is less than High School
-------------------------------------------------------------------------------------------
-------------------------------------------------------

                  type:  numeric (float)

                 range:  [0,1]                       units:  1
         unique values:  2                        missing .:  0/25,509

            tabulation:  Freq.  Value
                        23,606  0
                         1,903  1

. *List will print out values for the variables and records/observations specified
. list stringvar respid stateq censusreg sloan sl_concern ed_lths in 1/10

     +-------------------------------------------------------------------+
     | string~r   respid     stateq   census~g   sloan   sl_con~n   ed_lths |
```

```
     |-----------------------------------------------------------------|
  1. |    apple        8   Minnesot    Midwest       0          .         0 |
  2. |    apple       10    Florida      South       0          .         0 |
  3. |    apple       11   Michigan    Midwest       0          .         0 |
  4. |    apple       12   Illinois    Midwest       0          .         0 |
  5. |    apple       13      Texas      South       1          1         0 |
     |-----------------------------------------------------------------|
  6. |    apple       14   Mississi      South       0          .         0 |
  7. |    apple       15   New Jers   Northeas       0          .         0 |
  8. |    apple       16   Massachu   Northeas       1          0         0 |
  9. |    apple       17   Californ       West       0          .         0 |
 10. |    apple       18   Arkansas      South       0          .         0 |
     +-----------------------------------------------------------------+

.
.
. ***Descriptive statistics***
. *You may want to examine variables of interest for your analysis more closely
. *or include descriptive statistics for them in your study
.
. *Use summarize for discrete or continuous numeric variables,
. *tabulate for ordinal or categorical variables,
. *and either for dummies/binary/indicators:
.
. *summarize the age variable
. summarize A3A

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
         A3A |     25,509    47.00588    16.07551         18        101

. *or we can summarize more than one variable at a time
. *(age and whether observation is white):
. summarize A3A  r_white

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
         A3A |     25,509    47.00588    16.07551         18        101
     r_white |     25,509    .7336626    .4420514          0          1

. *tabulate education category variable
. tabulate ed_catvar

                 ed_catvar |      Freq.     Percent        Cum.
---------------------------+-----------------------------------
    Less than High School |      1,903        7.46        7.46
High School or equivalent |      6,561       25.72       33.18
             Some College |      8,419       33.00       66.18
                  College |      5,343       20.95       87.13
      Postgraduate Degree |      3,283       12.87      100.00
---------------------------+-----------------------------------
                    Total |     25,509      100.00

. *tabulate student loan recipiency variable with the missing option (, missing)
.         *at the end of the command after a comma to show any missing values
.         *(coded as . for numeric data and "" for string data)
. tabulate sloan, missing

R currently |
has student |
      loans |      Freq.     Percent        Cum.
------------+-----------------------------------
          0 |     20,049       78.60       78.60
          1 |      5,141       20.15       98.75
          . |        319        1.25      100.00
------------+-----------------------------------
      Total |     25,509      100.00

. *You usually don't have to type out the whole expression,
. *Stata will know what you mean if you abbreviate as long as
```

```
. *there is no ambiguity with other commands, variables, options, etc.
. tab sloan, m

R currently |
has student |
      loans |      Freq.     Percent        Cum.
------------+-----------------------------------
          0 |     20,049       78.60       78.60
          1 |      5,141       20.15       98.75
          . |        319        1.25      100.00
------------+-----------------------------------
      Total |     25,509      100.00

. *Another option: see a labeled numeric variable without its value labels
.         *(i.e. see the underlying numeric values)
. tab B1

Do you [Does your |
household] have a |
checking account? |      Freq.     Percent        Cum.
------------------+-----------------------------------
              Yes |     22,948       89.96       89.96
               No |      2,151        8.43       98.39
       Don't know |        107        0.42       98.81
Prefer not to say |        303        1.19      100.00
------------------+-----------------------------------
            Total |     25,509      100.00

. tab B1, nolabel

     Do you |
 [Does your |
 household] |
     have a |
   checking |
   account? |      Freq.     Percent        Cum.
------------+-----------------------------------
          1 |     22,948       89.96       89.96
          2 |      2,151        8.43       98.39
         98 |        107        0.42       98.81
         99 |        303        1.19      100.00
------------+-----------------------------------
      Total |     25,509      100.00

. *Also, use tabulate with two categorical variables to show their crosstab:
. tab ed_catvar sloan , missing

                      |  R currently has student loans
           ed_catvar |         0          1          . |     Total
----------------------+---------------------------------+----------
Less than High School |     1,765         94         44 |     1,903
High School or equiva |     5,849        612        100 |     6,561
         Some College |     6,311      2,013         95 |     8,419
              College |     3,739      1,551         53 |     5,343
  Postgraduate Degree |     2,385        871         27 |     3,283
----------------------+---------------------------------+----------
                Total |    20,049      5,141        319 |    25,509


. tab ed_catvar sloan, column //the column option reports the % within each row that are in
each column category (%s in columns sum to 100%)

+-------------------+
| Key               |
|-------------------|
|     frequency     |
| column percentage |
+-------------------+

                      |    R currently has
```

```
                      |     student loans
            ed_catvar |         0          1 |     Total
----------------------+----------------------+----------
Less than High School |     1,765         94 |     1,859
                      |      8.80       1.83 |      7.38
----------------------+----------------------+----------
High School or equiva |     5,849        612 |     6,461
                      |     29.17      11.90 |     25.65
----------------------+----------------------+----------
         Some College |     6,311      2,013 |     8,324
                      |     31.48      39.16 |     33.04
----------------------+----------------------+----------
              College |     3,739      1,551 |     5,290
                      |     18.65      30.17 |     21.00
----------------------+----------------------+----------
  Postgraduate Degree |     2,385        871 |     3,256
                      |     11.90      16.94 |     12.93
----------------------+----------------------+----------
                Total |    20,049      5,141 |    25,190
                      |    100.00     100.00 |    100.00
```

. tab ed_catvar sloan, row //the row option reports the % within each column that are in each row category (%s in rows sum to 100%)

```
+----------------+
| Key            |
|----------------|
|   frequency    |
| row percentage |
+----------------+

                      |    R currently has
                      |     student loans
            ed_catvar |         0          1 |     Total
----------------------+----------------------+----------
Less than High School |     1,765         94 |     1,859
                      |     94.94       5.06 |    100.00
----------------------+----------------------+----------
High School or equiva |     5,849        612 |     6,461
                      |     90.53       9.47 |    100.00
----------------------+----------------------+----------
         Some College |     6,311      2,013 |     8,324
                      |     75.82      24.18 |    100.00
----------------------+----------------------+----------
              College |     3,739      1,551 |     5,290
                      |     70.68      29.32 |    100.00
----------------------+----------------------+----------
  Postgraduate Degree |     2,385        871 |     3,256
                      |     73.25      26.75 |    100.00
----------------------+----------------------+----------
                Total |    20,049      5,141 |    25,190
                      |     79.59      20.41 |    100.00
```

. tab ed_catvar sloan, cell //the cell option reports the % in the entire table total that are in each cell (%s in cells sum to 100%)

```
+-----------------+
| Key             |
|-----------------|
|    frequency    |
| cell percentage |
+-----------------+

                      |    R currently has
                      |     student loans
            ed_catvar |         0          1 |     Total
----------------------+----------------------+----------
Less than High School |     1,765         94 |     1,859
```

```
                      |      7.01       0.37 |      7.38
----------------------+----------------------+----------
High School or equiva |     5,849        612 |     6,461
                      |     23.22       2.43 |     25.65
----------------------+----------------------+----------
         Some College |     6,311      2,013 |     8,324
                      |     25.05       7.99 |     33.04
----------------------+----------------------+----------
              College |     3,739      1,551 |     5,290
                      |     14.84       6.16 |     21.00
----------------------+----------------------+----------
  Postgraduate Degree |     2,385        871 |     3,256
                      |      9.47       3.46 |     12.93
----------------------+----------------------+----------
                Total |    20,049      5,141 |    25,190
                      |     79.59      20.41 |    100.00


.
. *another way to look at your data - graphs
. *Histogram showing the distribution of age:
. histogram A3A
(bin=44, start=18, width=1.8863636)

.
.
. ***Subsetting your data***
. *IF and IN statements allow you to operate on subsets of your data
. *IN statements define subsets based on records' index (observation) number
. *IF statements define subsets based on conditional statements
.         *& is AND
.         *| is OR
.         *Use == to compare the equality of two values
.         * != is not equal to (! is NOT in general)
.         * > is greater than
.         * < is less than
.         * >= is greater than or equal to (= must come after < or >, not before or it will
not work, i.e. >= is CORRECT; => is INCORRECT)
.         * <= is less than or equal to
. *Summarize age for just observations less than age 50:
. summarize A3A  if A3A < 50

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
         A3A |     13,507    34.19094    9.127357         18         49

. *Tabulate education for just observations less than age 50:
. tabulate  ed_catvar  if A3A < 50

                ed_catvar |      Freq.     Percent        Cum.
--------------------------+-----------------------------------
    Less than High School |      1,313        9.72        9.72
High School or equivalent |      3,350       24.80       34.52
             Some College |      4,307       31.89       66.41
                  College |      3,091       22.88       89.29
      Postgraduate Degree |      1,446       10.71      100.00
--------------------------+-----------------------------------
                    Total |     13,507      100.00

. *or just those whose age is equal to 50:
. tabulate  ed_catvar  if A3A == 50

                ed_catvar |      Freq.     Percent        Cum.
--------------------------+-----------------------------------
    Less than High School |         42        7.53        7.53
High School or equivalent |        163       29.21       36.74
             Some College |        166       29.75       66.49
                  College |        130       23.30       89.78
      Postgraduate Degree |         57       10.22      100.00
--------------------------+-----------------------------------
```

```
      Total |        558      100.00

.
. *We already used an 'in' expression with 'list' above to show the values of
. *some of our variables for the first ten observations:
. list stringvar respid stateq censusreg sloan sl_concern ed_lths in 1/10

     +-----------------------------------------------------------------------+
     | string~r   respid     stateq   census~g   sloan   sl_con~n   ed_lths |
     |-----------------------------------------------------------------------|
  1. |    apple        8   Minnesot    Midwest       0          .         0 |
  2. |    apple       10    Florida      South       0          .         0 |
  3. |    apple       11   Michigan    Midwest       0          .         0 |
  4. |    apple       12   Illinois    Midwest       0          .         0 |
  5. |    apple       13      Texas      South       1          1         0 |
     |-----------------------------------------------------------------------|
  6. |    apple       14   Mississi      South       0          .         0 |
  7. |    apple       15   New Jers   Northeas       0          .         0 |
  8. |    apple       16   Massachu   Northeas       1          0         0 |
  9. |    apple       17   Californ       West       0          .         0 |
 10. |    apple       18   Arkansas      South       0          .         0 |
     +-----------------------------------------------------------------------+

.
.
. ***Creating new variables and updating existing variables***
. *Be mindful of missing ("" if string or . if numeric ) values as well as special values
codes
. *Special values are often negative or high values like 9998, 9999, etc.
. *and can indicate "don't know," "refused," etc. in survey data.
.
. *always inspect your data initially via tab, summ, etc. to look for these and deal with
them appropriately
. *BEFORE constructing variables or starting your actual analysis
.
. *binary (0/1) age variable
. *The 'generate' creates a new variable with the name specified and set to the value after
the equals sign
. generate a1824 = 0

. *The 'replace' command updates the values of an existing variable;
.         *often you'll combine it with if statements to change the values of just a subset
of observations
. replace a1824 = 1 if A3A >= 18 & A3A < 25
(2,581 real changes made)

. *look at your variable after you make it
. tab a1824, m

      a1824 |      Freq.     Percent        Cum.
------------+-----------------------------------
          0 |     22,928       89.88       89.88
          1 |      2,581       10.12      100.00
------------+-----------------------------------
      Total |     25,509      100.00

. *And compare it to the original
. summarize A3A if a1824 == 0

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
         A3A |     22,928    49.91787    14.25653         25        101

. summarize A3A if a1824 == 1

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
         A3A |      2,581    21.13754    2.006788         18         24

. *Finally, label your variable
```

```
. label variable a1824 "age between 18 and 24"

.
. *You can also create categorical variables
. gen age_cat = .
(25,509 missing values generated)

. replace age_cat = 1 if  A3A > 17 & A3A < 25
(2,581 real changes made)

. replace age_cat = 2 if A3A > 24 & A3A < 61
(16,843 real changes made)

. replace age_cat = 3 if A3A > 60
(6,085 real changes made)

. *label your variable
. label variable age_cat "age categories"

. *label the values of your variable
. label define age 1 "18-24" 2 "25-60" 3 "more than 60"

. label values age_cat age

. tab age_cat, m

         age |
  categories |      Freq.     Percent        Cum.
-------------+-----------------------------------
       18-24 |      2,581       10.12       10.12
       25-60 |     16,843       66.03       76.15
more than 60 |      6,085       23.85      100.00
-------------+-----------------------------------
       Total |     25,509      100.00

. *Confirm that you created variable correctly by crosstabbing vs. original variable(s)
. tab A3A age_cat , m

                   |          age categories
What is your age? |     18-24      25-60  more than |     Total
------------------+-------------------------------+----------
               18 |       374          0          0 |       374
               19 |       294          0          0 |       294
               20 |       322          0          0 |       322
               21 |       395          0          0 |       395
               22 |       408          0          0 |       408
               23 |       385          0          0 |       385
               24 |       403          0          0 |       403
               25 |         0        408          0 |       408
               26 |         0        361          0 |       361
               27 |         0        406          0 |       406
               28 |         0        380          0 |       380
               29 |         0        435          0 |       435
               30 |         0        502          0 |       502
               31 |         0        450          0 |       450
               32 |         0        496          0 |       496
               33 |         0        433          0 |       433
               34 |         0        413          0 |       413
               35 |         0        469          0 |       469
               36 |         0        412          0 |       412
               37 |         0        430          0 |       430
               38 |         0        383          0 |       383
               39 |         0        390          0 |       390
               40 |         0        449          0 |       449
               41 |         0        415          0 |       415
               42 |         0        457          0 |       457
               43 |         0        464          0 |       464
               44 |         0        419          0 |       419
               45 |         0        475          0 |       475
               46 |         0        429          0 |       429
```

```
                                          Stata_Class_1
                47 |         0        466          0 |       466
                48 |         0        460          0 |       460
                49 |         0        524          0 |       524
                50 |         0        558          0 |       558
                51 |         0        555          0 |       555
                52 |         0        597          0 |       597
                53 |         0        571          0 |       571
                54 |         0        582          0 |       582
                55 |         0        538          0 |       538
                56 |         0        536          0 |       536
                57 |         0        481          0 |       481
                58 |         0        484          0 |       484
                59 |         0        523          0 |       523
                60 |         0        492          0 |       492
                61 |         0          0        467 |       467
                62 |         0          0        460 |       460
                63 |         0          0        418 |       418
                64 |         0          0        449 |       449
                65 |         0          0        738 |       738
                66 |         0          0        502 |       502
                67 |         0          0        424 |       424
                68 |         0          0        396 |       396
                69 |         0          0        367 |       367
                70 |         0          0        316 |       316
                71 |         0          0        232 |       232
                72 |         0          0        228 |       228
                73 |         0          0        199 |       199
                74 |         0          0        166 |       166
                75 |         0          0        139 |       139
                76 |         0          0        114 |       114
                77 |         0          0         80 |        80
                78 |         0          0         60 |        60
                79 |         0          0         58 |        58
                80 |         0          0         57 |        57
                81 |         0          0         42 |        42
                82 |         0          0         39 |        39
                83 |         0          0         27 |        27
                84 |         0          0         26 |        26
                85 |         0          0         27 |        27
                86 |         0          0         13 |        13
                87 |         0          0         12 |        12
                88 |         0          0          7 |         7
                89 |         0          0          4 |         4
                90 |         0          0          7 |         7
                91 |         0          0          2 |         2
                92 |         0          0          3 |         3
                93 |         0          0          2 |         2
                94 |         0          0          2 |         2
                99 |         0          0          1 |         1
     101 or older |         0          0          1 |         1
------------------+---------------------------------+----------
             Total |     2,581     16,843      6,085 |    25,509


.
. **Other kinds of variables to create
. *Scaling/transformations
. *Create an age in months variable based on the age in years:
. gen age_in_months = A3A*12

. sum age_in_months A3A

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
age_in_mon~s |     25,509    564.0706    192.9061        216       1212
         A3A |     25,509    47.00588    16.07551         18        101

. *Create age-squared
. gen age_squared = A3A*A3A
```

```
. sum age_squared A3A

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
 age_squared |     25,509    2467.965    1533.861        324      10201
         A3A |     25,509    47.00588    16.07551         18        101

. *Create logged-age
. gen age_logged = ln(A3A)

. sum age_logged A3A

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
  age_logged |     25,509    3.783343    .3809941   2.890372    4.61512
         A3A |     25,509    47.00588    16.07551         18        101

.
. *Create a new variable based on the value of multiple other variabls:
. *Create a new dummy variable based on a few other dummies rather than just one
. *B1 = checking acct; B2 = savings acct
. gen bankacct = .
(25,509 missing values generated)

. replace bankacct = 1 if B1 == 1
(22,948 real changes made)

. replace bankacct = 1 if B2 == 1
(598 real changes made)

. replace bankacct = 0 if B1 == 2 & B2 == 2
(1,558 real changes made)

. *could also have used an OR statement instead of an AND statement - depends on how you want
to define things
. replace bankacct = 0 if (B1 == 2 | B2 == 2) & bankacct ==.
(85 real changes made)

. *Confirm that you created variable correctly by crosstabbing vs. original variable(s)
. tab bankacct B1 if B2 != 1, m

           |     Do you [Does your household] have a
           |              checking account?
  bankacct |       Yes         No  Don't kno  Prefer no |     Total
-----------+--------------------------------------------+----------
         0 |         0      1,578         21         44 |     1,643
         1 |     4,522          0          0          0 |     4,522
         . |         0          0         74        246 |       320
-----------+--------------------------------------------+----------
     Total |     4,522      1,578         95        290 |     6,485


. tab bankacct B2 if B1 != 1, m

           | Do you [Does your household] have a savings
           |    account, money market account, or CD
  bankacct |       Yes         No  Don't kno  Prefer no |     Total
-----------+--------------------------------------------+----------
         0 |         0      1,623         16          4 |     1,643
         1 |       598          0          0          0 |       598
         . |         0          0         74        246 |       320
-----------+--------------------------------------------+----------
     Total |       598      1,623         90        250 |     2,561


.
. *Interaction variable: multiple the values of the female indicator and age
.         *to create a variable that captures females age but is 0 for males
. gen female_age = g_female*A3A
```

```
. *Compare the original and new variable for females and non-females:
. sum female_age A3A if g_female == 1

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
  female_age |     14,127    46.11814    16.08758         18        101
         A3A |     14,127    46.11814    16.08758         18        101

. sum female_age A3A if g_female == 0

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
  female_age |     11,382           0           0          0          0
         A3A |     11,382    48.10771    15.99282         18         99

.
.
. ***Stata help: once you can use a Stata help file, you should be able to figure out almost
any command!
. help summarize

. *Basic syntax of a Stata command:
. *commandname expression if/in expression , options
. *The 1st expression can contain variable names, assignement clauses, subcommands, etc. and
depend on the particular command
. *The if/in statement is followed by a 2nd expression defining the subset of the data set
you want the command to work on
. *Options always follow a single comma and are also command specific/dependent.
. *Reference the help file for more on options, syntax, etc. for specific commands
.
. *More on syntax is available here: http://www.stata.com/manuals13/gsw10.pdf
.
. *A list of basic Stata commands is available at:
. * http://www.stata.com/manuals13/u27.pdf
. * and
. * https://people.ucsc.edu/~aspearot/Econ113W13%20/basic_tutorial_stata.pdf
.
.
. *always save with a new name, do not overwrite your data.
. save "FINRA_02.dta", replace
file FINRA_02.dta saved

. log close
      name:  <unnamed>
       log:  D:\Users\hhassani\Desktop\Stata_Class_1.log
  log type:  text
 closed on:  29 Jun 2018, 09:59:19
----------------------------------------------------------------------------------------------
-------------------------------------------------------
```