First steps in Stata

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Motivation

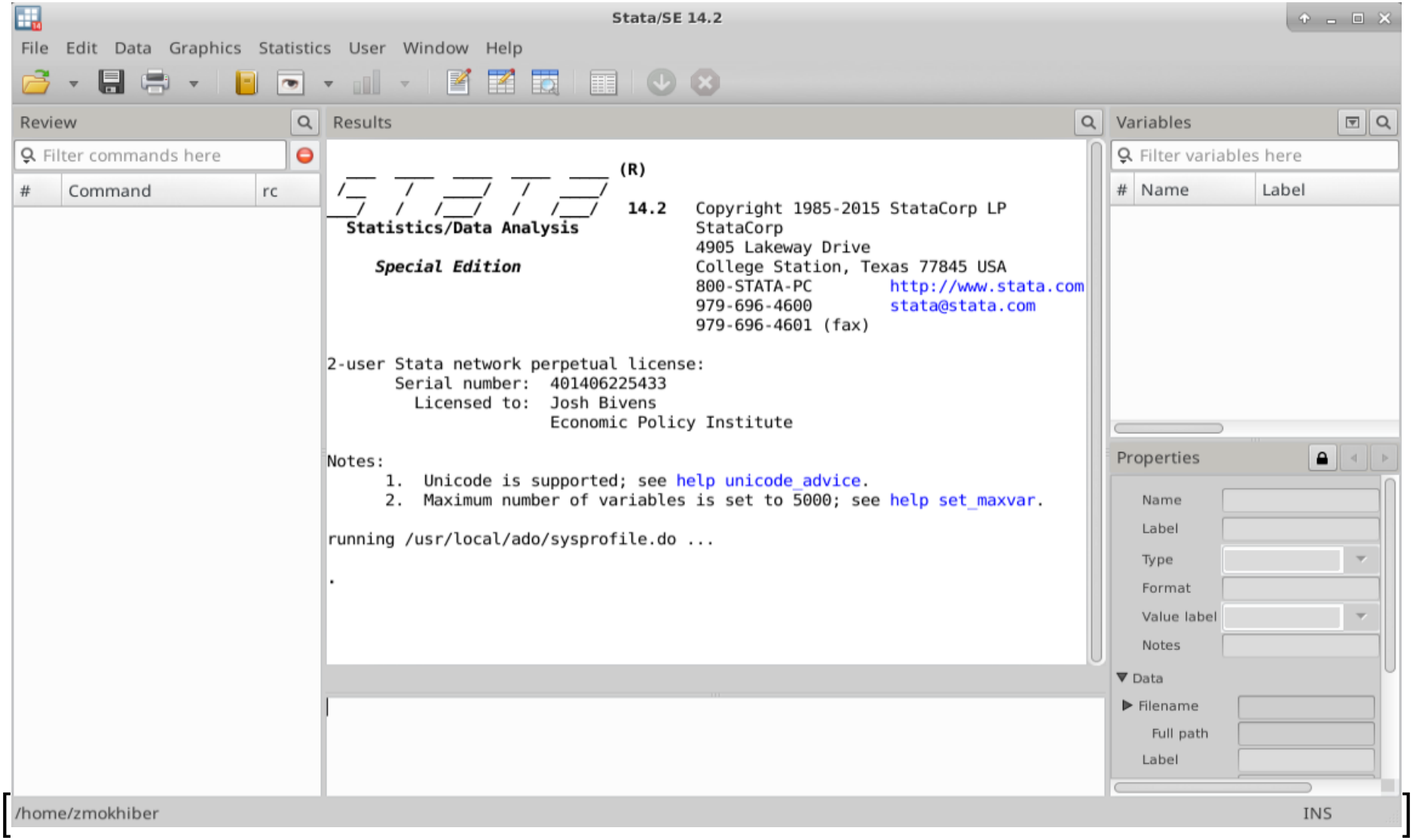
- What is Stata and why does EPI use it for data analysis?
  - Stata is statistical software
  - Easier to learn than other programs with similar functionality
  - Will enable EARN groups to conduct more sophisticated analysis than the EPI provided datasets allow (ie, swx, jobswatch, data library, etc)

Overview

- This is a crash course for using Stata for data analysis
- Using individual level data from the Current Population Survey (CPS), we will learn about:

1. Using Stata interactively
2. Key data concepts
3. What CPS microdata is
4. Basic analysis using microdata

Stata's graphical interface



Getting familiar with the interface

- Type an operation into Stata's command pane and see the output in the results pane

```
display 2+2
```

Open some data and look at it

- A simple example using boring data.
  - open the `auto.dta` example dataset

```
sysuse auto.dta
```

What is a dataset anyways?

- Think of your data like a spreadsheet
- In Stata terminology,
  - columns are `variables`
  - rows are `observations`
- `browse` opens the data browser window
- `auto.dta` is not very much data so we can look at the entire thing with

```
list
```

Getting more info about your data

- Here are some commands to describe what is in your data

```
describe
summarize
tabulate
```

- What is a Stata command?
  - type commands to perform operations in stata
  - all commands have a specific "syntax" that you have to follow

```
* typical stata syntax
command {variable list}{expressions}, (options)
```

Using commands to examine subsets of variables

- Instead of looking at all the variables, just investigate a few:

```
summarize price
tabulate foreign
```

- Stata lets you abbreviate some commands

```
summarize price
sum price

tabulate foreign
tab foreign

describe
d
```

- Help command

```
help describe
```

Data types

- Stata stores variables with different data types.
  - there are many data types but the main distinction is character or "string" variables vs numeric variables
- String variables store plain text (ie. "sample text" "dataset_1" "123")
- Numeric variables store numbers (ie 123, 4,000, 1, 0, 26)
- you cannot have both numeric and string values in the same variable
- mathematical operations can only be done on numeric values
  - may seem obvious, but 10 + 24 is not the same as "10" + "24" in Stata.

Value Labels

- When you look at a dataset with the `browse` function, many variables look like they have text, but Stata will say they are numeric.
  - these are "value labels"
  - they are a useful way to determine what a given number stands for in a categorical or indicator variable

```
label list origin
```

*can be confusing to assign value labels, but here is a good post on how to do it: https://stats.idre.ucla.edu/stata/modules/labeling-data/

Example research question: what are wages by race and gender in Ohio?

CPS microdata

- Current Population Survey (CPS)
  - Survey conducted by Census and the Bureau of Labor Statistics
  - Basic monthly data are released on the Census website
  - Primary source of monthly labor force statistics
- Why can't I use Excel to analyze microdata?
  - Excel is limited to 1,048,576 rows
  - it's not good at processing even tens of thousands of rows
  - not (easily) programmable
  - mistakes are hard to catch

EPI CPS extracts

- Use data from the EPI microdata webiste
  - variables recoded and harmonized across time by EPI
  - already in stata format
  - variables are consistent with EPI methodological choices
- Why CPS over ACS?
  - both surveys have their strengths
  - the CPS is typically better for answering questions about wages and unions

Using the data

- what data should we choose?
  - lets start with one year of data
  - 2020 data is provided for you already
  - make sure the data is in your working directory
- The working directory is where stata looks for data files and also where it saves/outputs files if not otherwise specified

```
pwd /* this prints the working directory to
       the output window */
cd /* this allows you to change the working directory */
```

Using the data

- The `use` command loads data into stata
  - stata data files have the `.dta` extension

```
use epi_cpsorg_2020.dta, clear
```

- The `clear` option allows you to use the data even if there is already data in memory
- If the file is already in the working directory, you don't need to specify a file path

Creating new variables: indicator variables

- Use `tabulate` to look at the state variable, then `generate` to create an indicator variable

```
generate oh = 0
replace oh = 1 if statefip == 39
```

- What's the going on with the mixture of = and ==?
- = is the assignment operator
- == is the equivalence operator
- Other ways to create a OH indicator

```
generate oh = 1 if statefip == 39
replace oh = 0 if statefip != 39
```

- If you use this syntax, stata knows you want to make an indicator variable

```
generate oh = statefip == 39
```

Restricting the sample

- It is often useful to select just those rows of your data based on a condition
  - for example select only rows where individuals are older than 16
- The following operators allow you to do this:

  == equal to

  != not equal to

  > greater than

  < less than

  >= greater than or equal to

  <= less than or equal to

  & and

  | or (this is the "pipe" character, `ctrl + \` on your keyboard)

Use = when you are assigning values, like `generate` or `replace`

Use == when you are testing a true/false condition ex: `if state == 39`

Restricting the sample

- We want to look at wages for people with positive wages age 16+ in Ohio in 2020
  - use the `keep` and `drop` commands to restrict the sample
  - will keep or drop observations based on a condition

```
* age restriction
keep if age >= 16

* Ohio only
keep if oh == 1
```

Note on dealing with missing values

- Sometimes, an observation for a given variable will be "missing".
  - Not everyone answers all questions in a survey
  - Some questions don't apply to certain individuals
- Stata stores missing values as '.'

```
sum wage
count if wage == .
```

Note on dealing with missing values (cont.)

- Stata treats missing values as the largest number.
- This keeps missing values

```
keep if wage > 0
tab wage if age < 16, m
```

- This drops missing values

```
keep if wage > 0 & wage ~= .
tab wage if age < 16, m
```

Race and ethnicity variables in the CPS

- The race variable in the EPI CPS extracts has several categories
  - check out the race variable methodology documentation for more information

```
tab wbho
```

- In our example we want to look at wages for various demographic cuts
  - many analyses by race have Hispanic as a category so we include it in the same variable
  - Census defines Hispanic ethnicity in a separate variable (`hispanic` also exists by itself the EPI extracts)
  - in `wbho`, race/ethnicity categories are mutually exclusive

Calculating some earnings statistics

- Use `summarize` to look at mean earnings
- Always use weights!
  - surveys are rarely true random samples
  - weights are added to make the sample look like the overall population

```
sum wage [w=orgwgt]
sum wage [w=orgwgt] if wbho == 1
sum wage [w=orgwgt] if wbho == 2
sum wage [w=orgwgt] if wbho == 1 & female == 1
```

Exercise: (wages by race and by sex in Ohio)

- Many stata commands allow the `by` and `bysort` commands

```
bysort wbho female: sum wage [w=orgwgt]
```

- but what if we want to do something more useful like make a graph or compare to other states?
  - you could copy the output into excel...

Transforming data: Collapse

- Instead of using the `bysort: sum` command, we can use the `collapse` command to transform the data
  - `collapse` replaces the data in memory with the new collapsed data
  - Extremely helpful when you want to calculate aggregate statistics from individual-level data
  - Allows you to continue your analysis with stata

```
collapse (mean) wage [aw=orgwgt], by(wbho female)
```

- WARNING: this will replace the data in memory, so ensure you don't save over the original individual level data
  - `preserve` and `restore` are useful when using `collapse` in stata interactively

Exporting the analysis

The collapsed data is easily exported to excel using the `export` command

```
export excel using ohio_wages.xlsx, ///
  replace firstrow(variables)
```

Resources/contact info

- All files associated with this presentation can be accessed at https://economic.github.io/data_bootcamp/
- Additional stata resources
  - Princeton intro to stata: https://data.princeton.edu/stata
  - UCLA learning modules https://stats.idre.ucla.edu/other/mult-pkg/seminars/#Stata and here https://stats.idre.ucla.edu/stata/modules/
  - Stata also has a large library of video tutorials: https://www.stata.com/links/video-tutorials/ and webinars: https://www.stata.com/training/webinar/
  - Stata cheat sheets: https://www.stata.com/bookstore/statacheatsheets.pdf
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