# Using Stata Effectively

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# Motivation

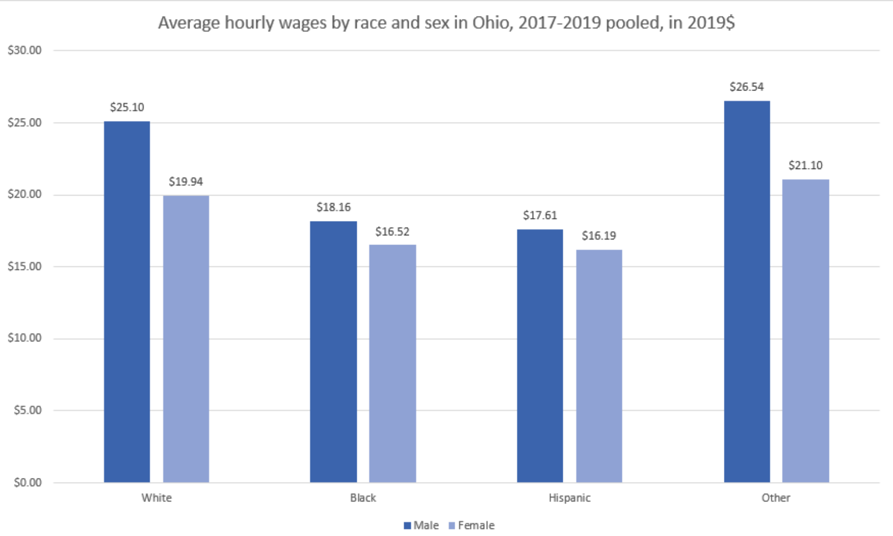
My goal is to teach you how to analyze microdata effectively and efficiently

- Allows you to answer questions you might not be able to otherwise answer using published data
  - ex: hourly wages by race and sex in a specific state
- Emphasis on file management and reproducability
  - Analysis can be easily replicated by others (including future you)
  - Code/scripts are easily modified and tweaked, without re-doing everything

# Overview

- Writing do-files in Stata using best practices and proper documentation
- Intermediate Stata operations: joining datasets, transforming data, macros, loops, exporting data, pooling data
- How to properly set up a project: directory structure, working directories, and storing raw data
- BONUS: Use EPI Stata data resources!

# Example final product



# Best practice: write do files

- Instead of typing commands in the command window, we can write them in a script, which stata calls a “do file”
- it’s just a plain text file with the extension “.do”
- Why do we write do-files?
    - Your do-file is a fully documented record of the entire analysis
    - Your work is now easy to reproduce and much easier to update
    - It is much easier to spot mistakes and make improvements to code

# Preamble and comments

- Always document what your do-file does
  - other people may need to know
  - future you will definitely forget

```
* File: earn_data_bootcamp.do
* Desc: compare wages by race and sex in Ohio using the CPS
* Auth: Zane Mokhiber
```

- Stata ignores comments or text after a * at the beginning of a line
  - use comments to explain clearly what you're doing
- Comment blocks are also useful

```
/* this is a comment
and so is this
these words will be ignored by Stata */
```

# Preamble continued

Always put

```
set more off
clear all
```

at the beginning of your do file

- Useful to remove “more” prompts and start with a fresh workspace
- Make sure the working directory is set properly
  - however, it is bad practice to include `cd` in any do file

# Analysis from session 1

```stata
*load 2020 CPS ORG
use epi_cpsorg_2020, clear
*Create indicator variable for Ohio
generate oh = 0
replace oh = 1 if statefip == 39
* age restriction
keep if age >= 16
* Ohio only
keep if oh == 1
*calculate avg wages by race and sex
collapse (mean) wage [aw=orgwgt], by(wbho female)
```

# Transforming data: Reshape

- In order to do some calculations on the data, we need to `reshape` the data
  - Our data is in “long” format: there is one value variable and two categorical variables
  - We want to reshape it to a “wide” format so values can be added or subtracted from each other

```
reshape wide wage, i(female) j(wbho)
* rename reshaped variables
rename wage1 white
rename wage2 black
rename wage3 hispanic
rename wage4 other
```

Helpful article on reshape:
https://stats.idre.ucla.edu/stata/modules/reshaping-data-wide-to-long/

# Exporting the analysis

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

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

# Adding more data to our analysis

- What if we want to look at multiple years of data
- maybe the sample we are looking at isn't large enough
- want to view changes over time

Join data together using `append`

- General rule of thumb for sample size concerns
  - sample $> 1000$, no problems
  - sample $< 500$, you may need to take a closer look
- Use `tabulate` or `count` to investigate

# Best practice: store microdata files in one central location

- It's good practice to treat your raw data as "read only"
  - raw data never changes or moves
  - helps with reproducability
  - saves space by not duplicating data files across multiple projects
- create a "data" folder somewhere on your computer
  - ex: `C:\data\cps`

```
cd C:\data\cps\
unzipfile C:\Users\zmokhiber\Downloads\epi_cpsorg_1979_2021.z
cd C:\Users\zmokhiber\Documents\data_bootcamp
```

# Macros: store stuff for later

- with macros, you can store and refer to important things later
  - two types of macros, local and global
  - we'll just deal with local macros for now
  - syntax is `local {localname} {whatever you want to store}`
  - refer to the local after it is declared with ''

```
* random example
local currentyear 2020
display `currentyear'

*do some math
display `currentyear'-1
```

# Macros: store stuff for later

- to use the microdata, we have to type the full file path if it's not in our working directory
  - this is tedious
  - room for error if you have to type it a bunch of times
- Store the file path in a macro
  - in my case, the CPS files are in `C:\data\cps`

```
local datadir C:\data\cps\
use `datadir'epi_cpsorg_2010.dta
```

# Appending data

```
* Load 2018-2020 CPS ORG

use `datadir'epi_cpsorg_2018.dta, clear
append using `datadir'epi_cpsorg_2019.dta
append using `datadir'epi_cpsorg_2020.dta
```

# Merge in CPI for inflation adjustments

- Download the BLS CPI-U-RS from https://www.bls.gov/cpi/research-series/r-cpi-u-rs-home.htm.
- Use Excel to clean up and convert to .csv file
- import into stata

```
* CPI-U-RS from
* https://www.bls.gov/cpi/research-series/allitems
import delimited using bls_cpiurs.csv, clear
keep year avg
rename avg cpiurs
keep if cpiurs ~= .
save cpiurs.dta, replace
```

# Merge in CPI for inflation adjustments

- The merge function matches two Stata datasets on variables (columns)
- The syntax is `{stata} merge {dataset structures} {matching variables} using {using data}`
- Some Stata vocabulary
  - Your “master” data is what you currently have in memory
  - Your “using” data is what you merge onto the master data

# Merge in CPI for inflation adjustments

- in this case, our master dataset is the CPS data, since it's currently what is in memory
- using data is the CPI inflation adjustment
- many to one merge, matching variable between them is `year`

```
merge m:1 year using cpiurs.dta
```

# Inflation adjustment

- To inflation adjust the wage we calculate
- inflation-adjusted wage = wage * CPI 2020 / CPI data year
- In Stata use the return macro r(mean) to grab the 2020 CPI

```
sum cpiurs if year == 2020
display r(mean)
```

- Now we can inflation adjust wages in the CPS data:

```
* inflation adjust wages
sum cpiurs if year == 2020
replace wage = wage * (r(mean) / cpiurs)
```

# Exporting the analysis

After collapsing and reshaping the data, the collapsed data is easily exported to excel using the export command

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

# Loops: program more efficiently

Say we wanted to look at more than three years of data? * Use foreach or forvalues loop for repeated actions + saves you from typing the same code over and over

```
* load one year of data
use `datadir'epi_cpsorg_2011.dta,clear
* append years 2012-2020
forvalues year = 2012/2020{
    append using `datadir'epi_cpsorg_`year'.dta
}
* display years now available in memory
tab year
```

# Pool multiple years of data with `load_epiextracts`

Install the command

```
net from "https://microdata.epi.org/stata"`
net install load_epiextracts
```

Load multiple years of EPI CPS:

```
load_epiextracts, begin(2018m1) end(2020m12) sample(org) ///
sourcedir("C:\data\cps")
```

Limit your variable selection to save memory:

```
load_epiextracts, begin(2018m1) end(2020m12) sample(org) ///
sourcedir("C:\data\cps") ///
keep(year orgwgt wage statefips age wbho female mind03)
```

# Resources/contact info

- All files associated with this presentation can be accessed at https://economic.github.io/data_bootcamp/
- EPI CPS data resources: https://microdata.epi.org/
- 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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