combining (and reshaping) data

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outline

intuition

merge

[*] fancy merging

append, reshape, xpose

[*] joinby

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overview: merge, append, reshape, xpose, joinby

- ◇ merge, append, joinby combine
  - `https://www.ssc.wisc.edu/sscc/pubs/sfr-combine.htm`
- ◇ reshape, xpose change shape
- ◇ merge is key! perhaps the most important command
- ◇ reshape is useful and difficult
- ◇ append, xpose, joinby are rare
  - but good to know they are there and what they can do

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the power of merge

- merging is one of the most useful things you'll learn here
- great value comes from simple fact of merging data
- recall from intro: there's a ton data of (and growing!)
- but these data are mostly useless unless in one file!
- somehow organizations (and researchers) are in this persistent habit of having their data chopped up in tiny multiple files
- they're hungry for knowledge and want to make use of the data and this is where you come in! can make $ by just merging!
- (and then fun part: visualization/graphics in 2 weeks, but dat man first!)

easy to merge; difficult to do it right

- it depends on what kind of data (and luck) you have
- the challenge is to check what happened after the merge
- sometimes it all merges smoothly without any issues
- but almost always it doesn't
- and then the work begins
- **always investigate carefully non-merges**
- **make sure that *ALL* nonmerges are as expected**
- **even matches can be wrong**
  - use a lot of des sta to investigate
  - always be skeptical, ask yourself whether it makes sense

after merge

- typically some obs did not merge due to diff coding
- say "Poland≠ "Republic of Poland"
- "CAMDEN"≠"Camden" etc
- then go back and fix it before merge:
- replace ctry="Poland" if ctry=="Republic of Poland"
- in many cases it was not supposed to merge, say
  - there was country in A, but not in B
  - data in A was for 1995-2000, in B 1990-1998
  - etc
- but you have to be 100% sure that nonmerges were correct to happen!

to be honest

- to confess, what I sometimes do:
- I simply make a note to myself that I do not care now
- and I will investigate it later, that is
- I just put in there a '*LATER:' comment
- but I only do that if problem is small say around 5% of obs

dirty data

- the other challenge is to deal with dirty data
- most data are dirty: weird chars, mistakes, inconsistent names/codes, missing vals
- weird chars: %,$,#, etc or non-english letters
- mistakes: should be 9, but it is 5, etc
- inconsistent names/codes: 'Camden'≠'CAMDEN'

merge (combines variables (same obs))

- let's generate 2 datasets by splitting one dataset into two
- and then merge back again
- `use gss.dta, clear`
- `gen id=_n`
- `keep id region`
- `save gss1.dta, replace` (**using**) has region
- `use gss.dta, clear`
- `gen id=_n`
- `keep id inc` (**master**) has inc
- `merge 1:1 id using gss1.dta` (combine with (**using**)

merge contn'd

- after merging **always** think about output:
- `tab _merge`
- variable _merge takes on 3 values:
- **3** obs in both datasets
- **1** obs in master only
- **2** obs in using only
- `dofile`

merging investigation

- from my experience, I have found particularly useful:
- `tab` _merge with time and geography
  - say year and state
- may also want to `list` or `edit` part of datafile
  - especially if it is small
- can also sort on _merge and other key vars
- it does take time to find out what happened

merge 1:m

- often you **merge 1:m**
- very useful command indeed
- but people often make a mistake of specifying **merge m:m**
- and I have never seen, cannot even think of situation when this would be applicable

sometimes need to collpase!

- sometimes may have many (non-unique) obs in one dataset
- and so the same in the other dataset
- say multiple animal abuses per zip in one
- and multiple shelters per zip in the other one
- cannot merge it!! need to collapse less important one
- say you're primarly interested in abuse, then collapse shelters: say count them by zip
- and merge that 1:m with multiple abuses by zip

be clear about merging

- want to be clear about nonmergers in paper!
  - say how many nonmerges and waht you did about it
  - eg dropped, fixed, etc

merging multiple files

- can merge at once
  - merge 1:1 id using A B C D
  - avoid at once, too messy
- better in some steps, eg A+B, C+D, AB+CD
  - or perhaps best A+B, AB+C, ABC+D, etc
- perhaps best first do easy and clean merges

1:1 merge on 2 vars

- ofen need to merge 1:1 on 2 vars
  - when 2 vars uniqely define obs
  - eg country-year, state-county
- merge 1:1 countryID year using B

what to merge on?

- geography! usually have some!
- can always aggregate up! say have city and state, so can merge m:1 on state
- time! say with weather–usually weather matters!
- occupation! there are occ codes eg `https://www.onetonline.org/find/descriptor/result/4.A.2.b.2`

census data: 5-yr ACS

- census is a good source of data, even at neighb lev!
- for city/neighb lev probably want 5-yr ACS
- `https://geomap.ffiec.gov/FFIECGeocMap/GeocodeMap1.aspx`
- `https://factfinder.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t`
- can search in top box but probably best select on the left from "Topics" eg: people-poverty-poverty
- then select "Geographies": eg census tracts (ie neighs)
  - go down to "All Census Tracts in Camden County" and hit "ADD TO YOUR SELECTIONS" and hit "CLOSE"
- and from "Show results from" pick "2015"
  - click "S1701, POVERTY STATUS IN THE PAST 12 MONTHS, ACS2011 2015"

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merging non-matching ids

- http://stats.stackexchange.com/questions/32830/suggestions-on-how-to-merge-multiple-datasets-with-an-imperfect-i
- (1) The Catcher and the Rye, 7/16/51
  (2) The Catcher & the Rye, 7/16/51
  (3) Catcher and the Rye, 1951
  (4) The Catcher and the Rye (1951), [missing]

merging non-matching ids

- ssc install strgroup
  - uses Levenshtein distances to do string matching
- reclink
  - probabilistic matching scheme
- `http://github.com/OpenRefine`

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Append

- Combines Observations (Same Var)
- Let's generate some data first
- use gss.dta, clear
- keep in 1/50
- save gss1.dta, replace (**using**)
- use gss.dta, clear
- keep in 51/100 (**master**)
- append using gss1.dta (combine with (**using**)
- dofile
- append is easy in practice as compared to merge

we are about to look at reshape

- reshape is a very peculiar command
- incredibly powerful, and difficult to understand
- i thought i have mastered stata
- but whenever i reshape, i always scratch my head
  - i just always help reshape –useful examples to clarify
- yet reshape is the only way out in many situations
- we will try to use it often

xpose, reshape

- `xpose` interchanges Vars and Obs
- `reshape` converts wide-to-long/long-to-wide
- `help reshape` (very useful diagram–i always use it!)
- `reshape long var, i(id) j(year)`
- var is a common part of var that repeats, i.e. prefix,
- id is always unique (eg made by `gen id=_n`)
- year is a new variable that takes unique part from variable that repeats, i.e. suffix

reshape example

- use gss.dta, clear
- ren inc inc1
- gen inc2=2*inc1
- gen id=_n
- reshape long inc, i(id) j(period)
- edit
- dofile
- and lets go over output of reshape–it tells you how it changed!

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joinby

- https://www.stata.com/manuals/u22.pdf
- https://www.stata.com/manuals14/djoinby.pdf
- https://stats.idre.ucla.edu/stata/faq/how-can-i-create-all-pairs-within-groups