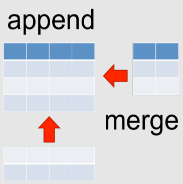

Stata Workshop 2: Data Management

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Resources

- Prof. Rodríguez http://data.princeton.edu/stata/
- Mitchell(2010) *Data Management Using Stata* http://www.stata-press.com/books/data-management-using-stata/
- UCLA ATS http://www.ats.ucla.edu/stat/stata/
- Stata Support Main http://stata.com/support/
- Stata Resources http://stata.com/links
- Stata `help` has links to manual pdf files or using browser: http://www.stata-press.com/manuals/documentation-set/
- This presentation and do files are available at github: http://github.com/Chang-Y-Chung/dm

Topics

- Dataset
- Describe / List
- Tabulate / Summarize
- Generate / Replace
- Import from / Export to Excel file
- Append / Merge
- Infile (Free format / Using a dictionary)
- Date / Time *
- By-Group Processing / Egen *

Last two are for self-study. Stata do files are provided

Setup

- example do file (dm.do) and other files are in the zip file attachment (dm.zip) sent to you this afternoon

```
// cd to where you put this file (dm.do)
cd z:\dm

// check which directory I am in
pwd
```

Display

```
clear all
display 1 + 2

display ln(0.3 / (1 - 0.3))
display logit(0.3)

// it can display strings as well
display "hello, world?"

// some system values
display c(current_date)
```

Stata Dataset

```
// dataset is an array of observations (rows) on variables (columns)
clear all

// describe the current stata dataset in memory ("master" dataset)
describe

// create some observations -- still no variables
set obs 5

// create a variable, x, with all the values equal to 1
generate x = 1

// create another variable, y, with the built-in obs number, _n
generate y = _n

// save the master data into a file on the harddrive
save mydata.dta, replace
```

Use and List a Dataset

```
use mydata, clear // load the data into main memory
list
```

```
## . use mydata, clear // load the data into main memory
## . list
##      +-------+
##      | x   y |
##      |-------|
##   1. | 1   1 |
##   2. | 1   2 |
##   3. | 1   3 |
##   4. | 1   4 |
##   5. | 1   5 |
##      +-------+
```

Replace

```
use mydata, clear

replace x = 2

// replace is often used with either "in" or "if"
replace x = 3 in 1/3
replace y = 9 if y == 5

// you can refer to other variables in the condition as well
replace x = -99 if y < 3

// suppose that -99 in x and 9 in y are missing values
replace x = . if x == -99
replace y = . if y == 9

save mydata2, replace
```

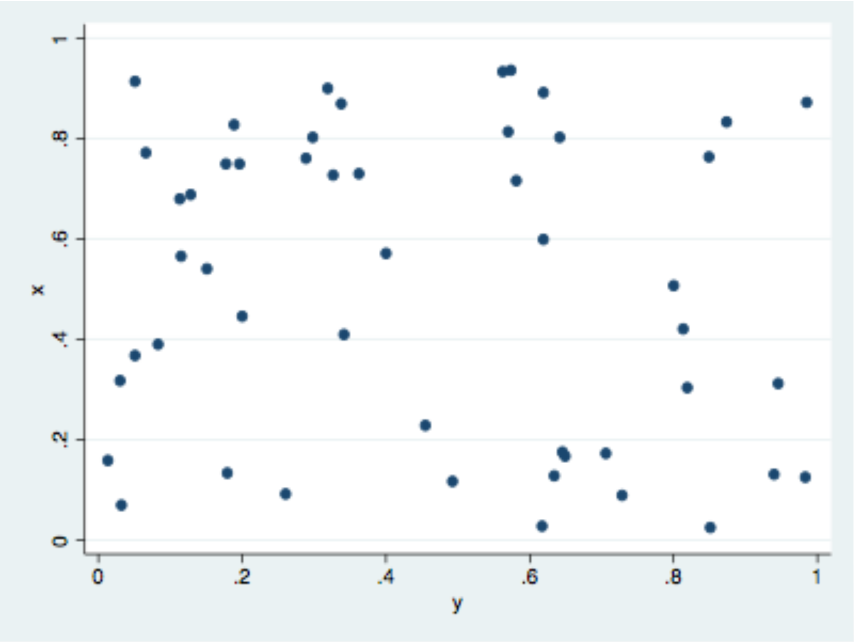
See mydata2.dta

```
use mydata2, clear
list in 1/5
```

```
## . use mydata2, clear
## . list in 1/5
##      +-------+
##      | x   y |
##      |-------|
##   1. | .   1 |
##   2. | .   2 |
##   3. | 3   3 |
##   4. | 2   4 |
##   5. | 2   . |
##      +-------+
```

Random Data

```
clear all
set obs 50
set seed 12345
generate x = runiform()
generate y = runiform()
twoway scatter x y
graph export random.png, width(400) height(300) replace
```



Any questions so far?

Missing Values

```
use mydata2, clear
list
```

```
## . use mydata2, clear
## . list
##       +-------+
##       | x   y |
##       |-------|
##    1. | .   1 |
##    2. | .   2 |
##    3. | 3   3 |
##    4. | 2   4 |
##    5. | 2   . |
##       +-------+
```

Dichotomizing y around 2.5

```
use mydata2, clear

// this may *not* be correct
generate high_y = 0
replace high_y = 1 if 2.5 < y

// correct way
generate high_y2 = 0 if !missing(y)
replace high_y2 = 1 if 2.5 < y & !missing(y)

save mydata3, replace
```

mydata3.dta

```
use mydata3, clear
list y high_y high_y2
```

```
## . use mydata3, clear
## . list y high_y high_y2
##      +----------------------+
##      | y   high_y   high_y2 |
##      |----------------------|
##   1. | 1        0         0 |
##   2. | 2        0         0 |
##   3. | 3        1         1 |
##   4. | 4        1         1 |
##   5. | .        1         . |
##      +----------------------+
```

Save

```
// create and save
clear all
input id str10 name yob
1 "Amy" 1990
2 "Bill" 1991
3 "Cathy" 1989
end
rename yob year_of_birth
save birth, replace
```

Use

```
use birth, clear
assert _N == 3
list, abbreviate(15)
```

```
## . use birth, clear
## . assert _N == 3
## . list, abbreviate(15)
##      +----------------------------+
##      | id    name   year_of_birth |
##      |----------------------------|
##   1. |  1     Amy            1990 |
##   2. |  2    Bill            1991 |
##   3. |  3   Cathy            1989 |
##      +----------------------------+
```

Labels

```
use birth.dta, clear
generate gender = 1 if name == "Amy" | name == "Cathy"
replace gender = 2 if name == "Bill"
tabulate gender
save birth2, replace
```

```
## . use birth.dta, clear
## . generate gender = 1 if name == "Amy" | name == "Cathy"
## (1 missing value generated)
## . replace gender = 2 if name == "Bill"
## (1 real change made)
## . tabulate gender
##      gender |      Freq.     Percent        Cum.
## ------------+-----------------------------------
##           1 |          2       66.67       66.67
##           2 |          1       33.33      100.00
## ------------+-----------------------------------
##       Total |          3      100.00
## . save birth2, replace
## (note: file birth2.dta not found)
## file birth2.dta saved
```

Labeling Values Takes Two Steps:

```
use birth2, clear

// 1. create the value label itself. we use the same name
label define gender 1 "girl" 2 "boy"

// 2. attach the value label to a variable
label values gender gender

save birth3, replace
```

Check

```
use birth3, clear

tabulate gender
```

```
## . use birth3, clear
## . tabulate gender
##      gender |      Freq.     Percent        Cum.
## ------------+-----------------------------------
##        girl |          2       66.67       66.67
##         boy |          1       33.33      100.00
## ------------+-----------------------------------
##       Total |          3      100.00
```

Labeling a Variable

```
use birth3, clear

// labeling a variable is simpler
label var gender "Gender of the respondent"

describe gender
```

```
## . use birth3, clear
## . // labeling a variable is simpler
## . label var gender "Gender of the respondent"
## . describe gender
##                storage   display    value
## variable name   type     format     label      variable label
## -----------------------------------------------------------------------------------------------
## gender          float    %9.0g      gender     Gender of the respondent
```

Some Variables from Auto.dta

```
sysuse auto, clear
describe make price mpg foreign
```

```
## . sysuse auto, clear
## (1978 Automobile Data)
## . describe make price mpg foreign
##               storage   display    value
## variable name   type    format     label      variable label
## -----------------------------------------------------------------------------------------------
## make            str18   %-18s                 Make and Model
## price           int     %8.0gc                Price
## mpg             int     %8.0g                 Mileage (mpg)
## foreign         byte    %8.0g      origin     Car type
```

Tabulate

With Value Label

```
sysuse auto, clear
tabulate foreign
```

```
## . sysuse auto, clear
## (1978 Automobile Data)
## . tabulate foreign
##    Car type |      Freq.     Percent        Cum.
## ------------+-----------------------------------
##    Domestic |         52       70.27       70.27
##     Foreign |         22       29.73      100.00
## ------------+-----------------------------------
##       Total |         74      100.00
```

Tabulate

Without Value Label

```
sysuse auto, clear
tabulate foreign, nolabel
```

```
## . sysuse auto, clear
## (1978 Automobile Data)
## . tabulate foreign, nolabel
##    Car type |      Freq.     Percent        Cum.
## ------------+-----------------------------------
##           0 |         52       70.27       70.27
##           1 |         22       29.73      100.00
## ------------+-----------------------------------
##       Total |         74      100.00
```

Summarize

```
sysuse auto, clear
summarize price mpg
```

```
## . sysuse auto, clear
## (1978 Automobile Data)
## . summarize price mpg
##     Variable |        Obs        Mean    Std. Dev.       Min        Max
## -------------+---------------------------------------------------------
##        price |         74    6165.257    2949.496       3291      15906
##          mpg |         74     21.2973    5.785503         12         41
```

Other Useful Commands

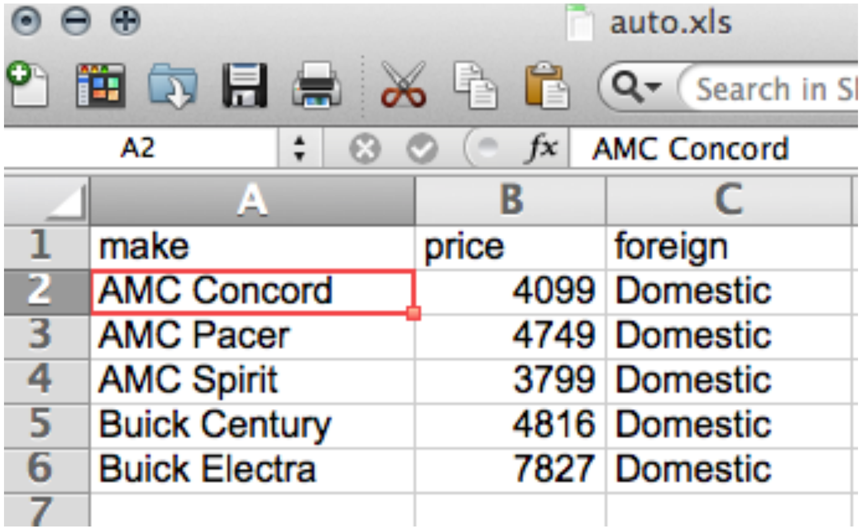
```
sysuse auto, clear

describe make mpg price
inspect make mpg price
codebook make mpg price
```

Export to Excel

```
sysuse auto, clear
keep make price foreign
keep in 1/5

export excel using auto.xls, replace first(var)
!start auto.xls    // windows
// !open auto.xls    // mac
```



	A	B	C
1	make	price	foreign
2	AMC Concord	4099	Domestic
3	AMC Pacer	4749	Domestic
4	AMC Spirit	3799	Domestic
5	Buick Century	4816	Domestic
6	Buick Electra	7827	Domestic
7			

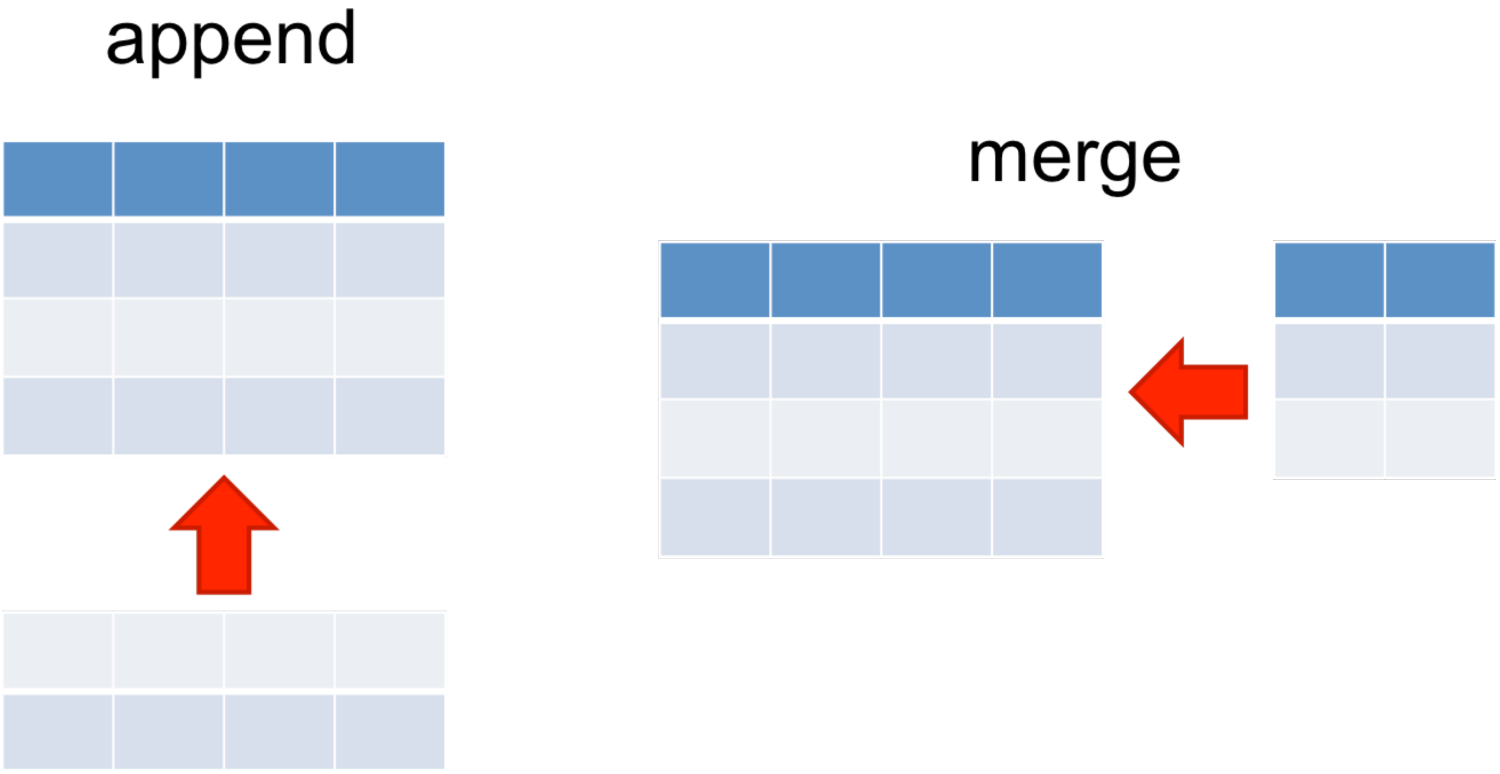
Import from Excel

```
import excel using auto.xls, clear firstrow
describe
```

```
## . import excel using auto.xls, clear firstrow
## . describe
## Contains data
##   obs:                5
##  vars:                3
##  size:              115
## -----------------------------------------------------------------------------------------------
##               storage   display    value
## variable name   type    format     label      variable label
## -----------------------------------------------------------------------------------------------
## make            str13   %13s                  make
## price           int     %10.0g                price
## foreign         str8    %9s                   foreign
## -----------------------------------------------------------------------------------------------
## Sorted by:
##      Note:  dataset has changed since last saved
```

Break for Q & A

Combining Datasets

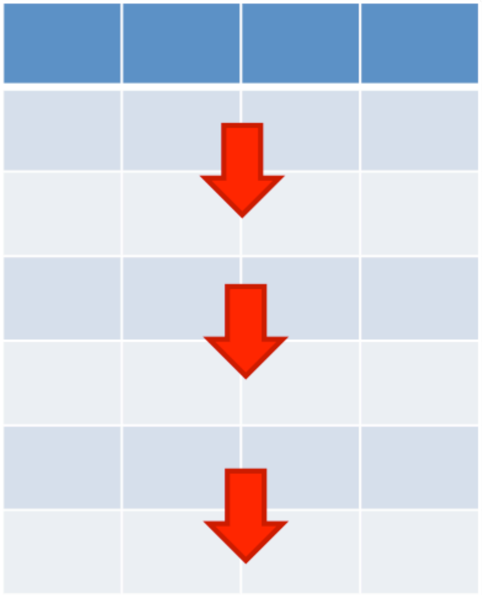


append

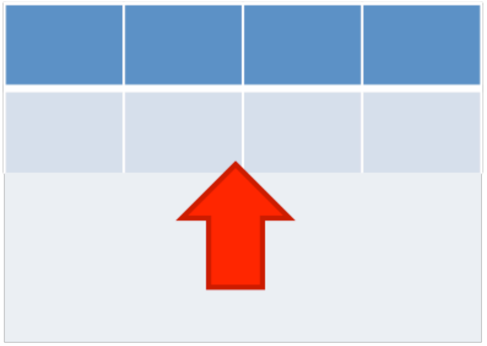
merge

Combining Datasets

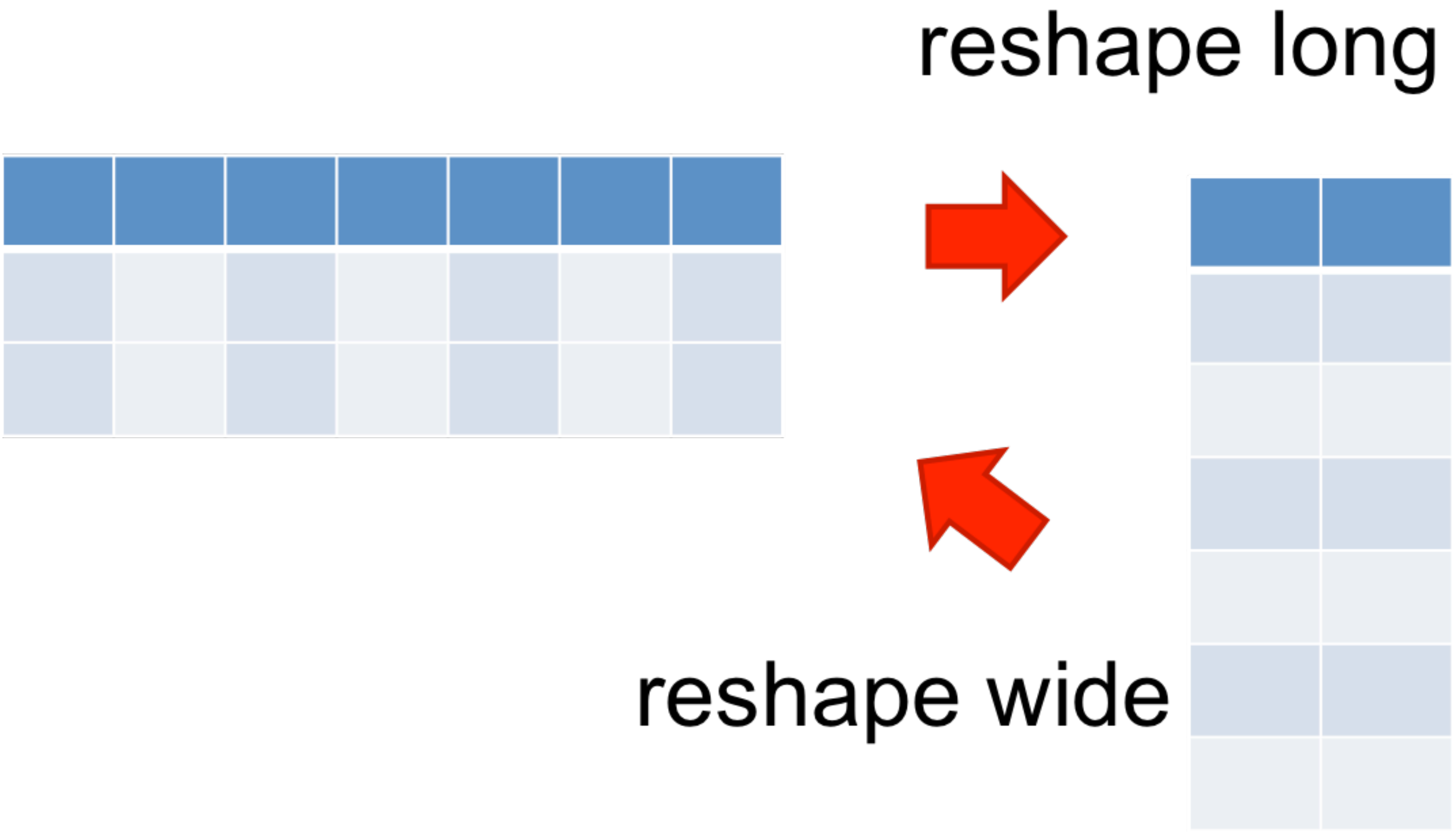
expand



collapse / contract



Combining Datasets

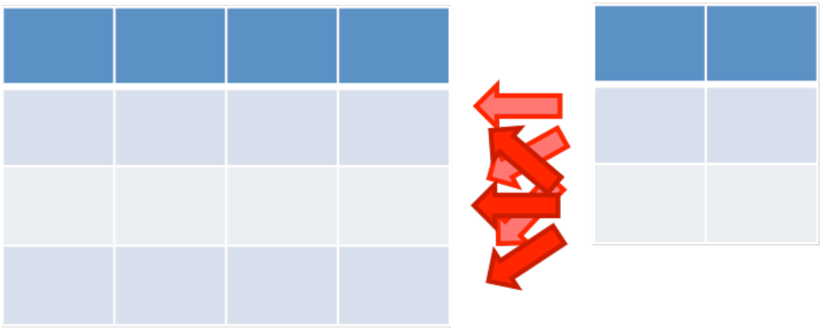


reshape long

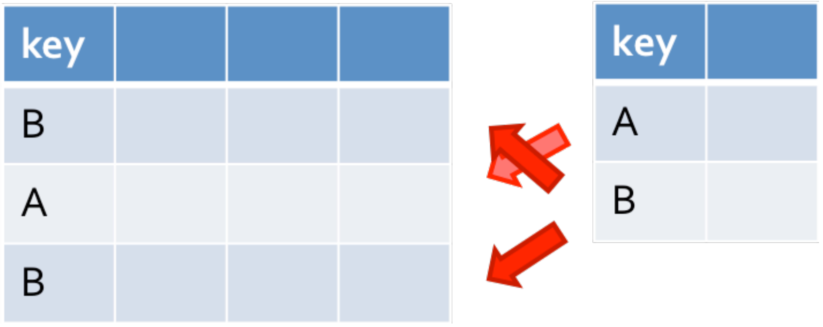
reshape wide

Combining Datasets

cross



joinby



key			
B			
A			
B			

key	
A	
B	

Append Example

Creating odd.dta

```
use http://www.stata-press.com/data/r13/odd1.dta, clear
keep in 1/3
list
save odd.dta, replace
```

```
## . use http://www.stata-press.com/data/r13/odd1.dta, clear
## (First five odd numbers)
## . keep in 1/3
## (2 observations deleted)
## . list
##      +--------------+
##      | odd   number |
##      |--------------|
##   1. |   1        1 |
##   2. |   3        2 |
##   3. |   5        3 |
##      +--------------+
## . save odd.dta, replace
## (note: file odd.dta not found)
## file odd.dta saved
```

Append Example

Creating even.dta

```
clear all
input number even odd
4 10 .
5 12 .
end
list
save even.dta, replace
```

```
## . use even.dta, clear
## . list
##      +---------------------+
##      | number    even    odd |
##      |---------------------|
##   1. |      4      10     . |
##   2. |      5      12     . |
##      +---------------------+
```

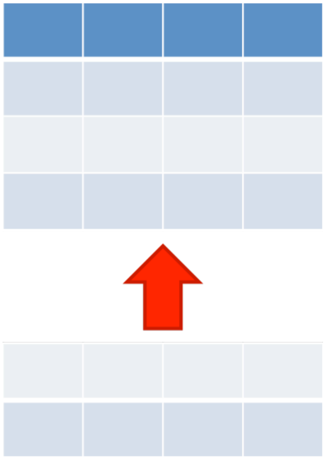
Append Example

Put odd and even Together

```
use odd.dta, clear
append using even.dta, generate(obsFrom)
list
```

```
## . use odd.dta, clear
## (First five odd numbers)
## . append using even.dta, generate(obsFrom)
## . list
##      +-------------------------------+
##      | odd   number   obsFrom   even |
##      |-------------------------------|
##   1. |   1        1         0      . |
##   2. |   3        2         0      . |
##   3. |   5        3         0      . |
##   4. |   .        4         1     10 |
##   5. |   .        5         1     12 |
##      +-------------------------------+
```

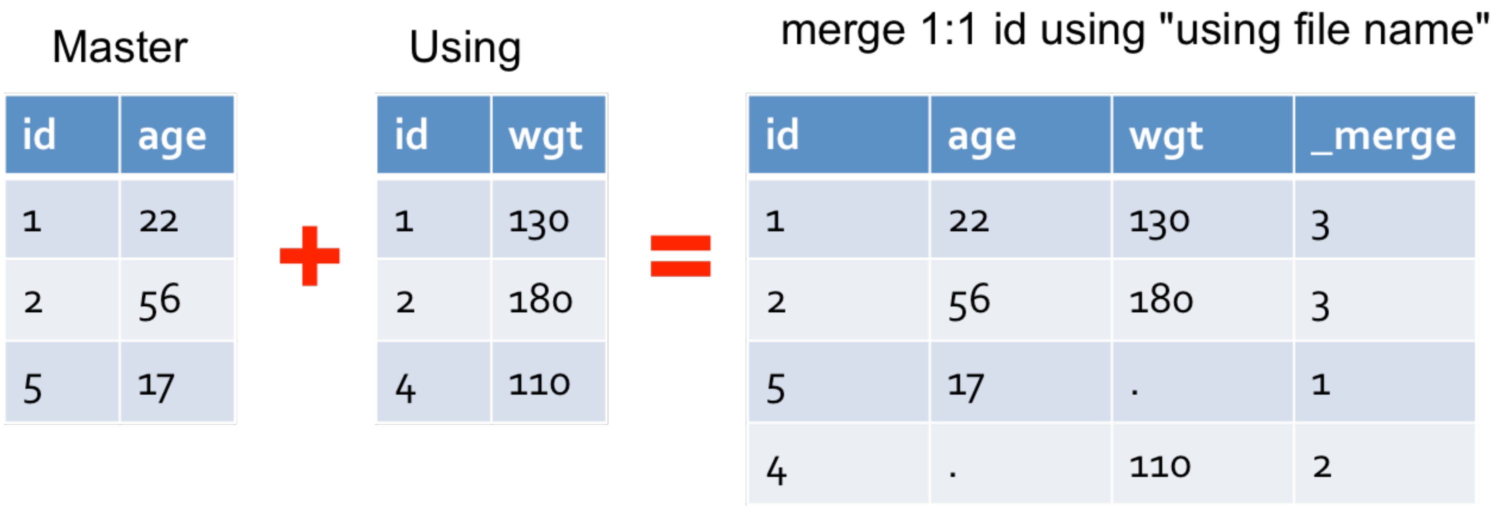
Append Pointers



- Syntax: `append using filename [, options]`
- Appends a dataset stored on disk (the *using* dataset) to the end of the dataset in memory (the *master* dataset)
- New master dataset will have more observations than before
- Variables are matched by *name* (not by variable order)
- Non-matched variables on the using side will be included

Merge Example

```
use age, clear // master
merge 1:1 id using weight, report
save ageWeight, replace
```



Master

id	age
1	22
2	56
5	17

+

Using

id	wgt
1	130
2	180
4	110

=

merge 1:1 id using "using file name"

id	age	wgt	_merge
1	22	130	3
2	56	180	3
5	17	.	1
4	.	110	2

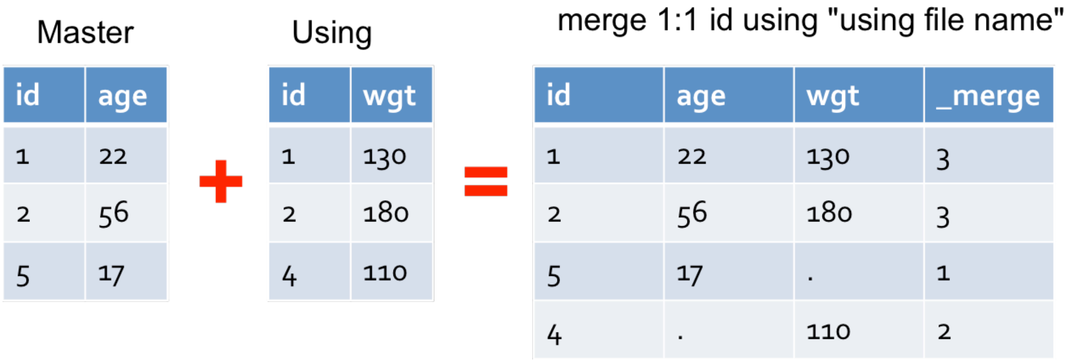
How Stata Merges

- Manual says (*Stata Data-Management Reference Manual* [D] Release 13, p. 465):

> The formal definition for merge behavior is the following: Start with the first observation of the master. Find the corresponding observation in the using data, if there is one. Record the matched or unmatched result. Proceed to the next observation in the master dataset. When you finish working through the master dataset, work through unused observations from the using data. By default, unmatched observations are kept in the merged data, whether they come from the master dataset or the using dataset.

- See also Bill Gould's two-part blog entry on "Merging data" at:
  - Part 1: Merges gone bad http://tinyurl.com/jvtloka
  - Part 2: Multiple-key merges http://tinyurl.com/krhs7xn

One-to-One Match Merge Pointers



Master

id	age
1	22
2	56
5	17

Using

id	wgt
1	130
2	180
4	110

merge 1:1 id using "using file name"

id	age	wgt	_merge
1	22	130	3
2	56	180	3
5	17	.	1
4	.	110	2

- Syntax: `merge 1:1 varlist using filename`
- Joins corresponding observations from master and using datasets, matching on the key variable(s).
- Master data are *inviolable*, i.e., if there already exists a variable in master, the values are not replaced.
- By default, merge creates a new variable, `_merge`, which indicates:
  - 1 (master) this obs from master dataset only
  - 2 (using) this obs from using dataset only
  - 3 (match) this obs from both master and using datasets

Break Time

- Any questions, so far?

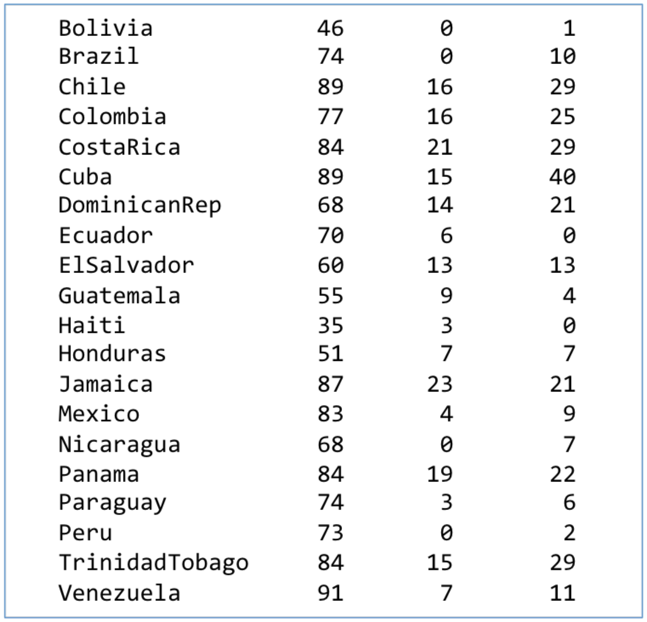
Inputting Raw Data

- Stata stores data in a proprietary format, i.e., the `.dta` file
- Once data are stored in a `.dta` file, we can quicky load the data into memory by the `use` command
- If data are given in other formats, we have to input / read / import them into stata first
- One common such format is known as a raw data file, which stata assumes to have a file extension of `.raw`

infile Example

```
infile str14 country setting effort change using test.raw, clear
list in 1/3
```

```
## . infile str14 country setting effort change using test.raw, clear
## (20 observations read)
## . list in 1/3
##      +--------------------------------------+
##      | country   setting   effort   change |
##      |--------------------------------------|
##   1. | Bolivia        46        0        1 |
##   2. |  Brazil        74        0       10 |
##   3. |   Chile        89       16       29 |
##      +--------------------------------------+
```



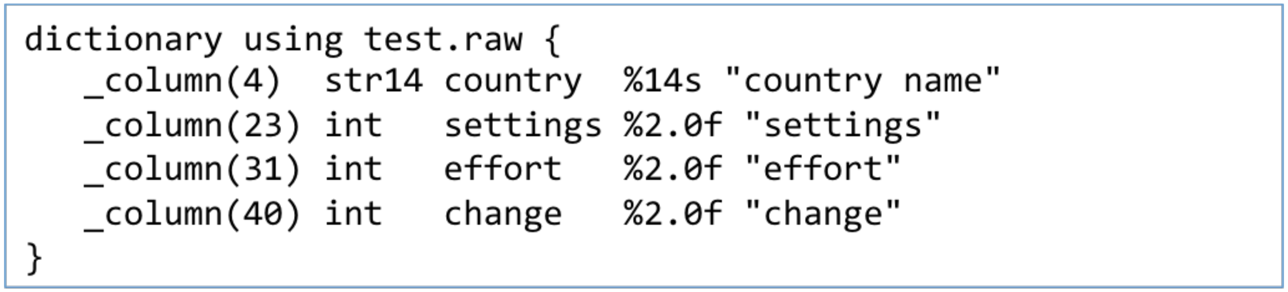
```
Bolivia         46     0     1
Brazil          74     0    10
Chile           89    16    29
Colombia        77    16    25
CostaRica       84    21    29
Cuba            89    15    40
DominicanRep    68    14    21
Ecuador         70     6     0
ElSalvador      60    13    13
Guatemala       55     9     4
Haiti           35     3     0
Honduras        51     7     7
Jamaica         87    23    21
Mexico          83     4     9
Nicaragua       68     0     7
Panama          84    19    22
Paraguay        74     3     6
Peru            73     0     2
TrinidadTobago  84    15    29
Venezuela       91     7    11
```

Free format raw data

- values are delimited by a space, tab, or comma
- string value is quoted if embeds spaces or commas
- if one observation per line, then consider using `insheet` instead

Fixed Column Format

- `test.raw` can also be read as a fixed column format, since the values of each variable appear in the fixed columns, for example:
  - country names are always in columns 4 to 17
  - settings values are always in columns 23 and 24
- This information can be stored in a separate *dictionary file*:
- `test.dct`



```
dictionary using test.raw {
   _column(4)  str14 country  %14s "country name"
   _column(23) int   settings %2.0f "settings"
   _column(31) int   effort   %2.0f "effort"
   _column(40) int   change   %2.0f "change"
}
```

- Using the dictionary file, the data can be read into stata like so:

```
infile using test.dct, clear
```

Import / Export Pointers

- Stat/Transfer can import / export data to and from various formats
- But don't blindly trust any piece of software that *translates* data from one system / package / application to another
- Be careful and double-check everything
- Ask help

Thanks a lot!

- Any questions?