Data Analysis with Stata Cheat Sheet

For more info, see Stata's reference manual (stata.com)

Results are stored as either r -class or e -class. See Programming Cheat Sheet

Summarize data

Examples use auto.dta (sysuse auto, clear) unless otherwise noted

univar price mpg, **boxplot** — ssc install univar
calculate univariate summary with box-and-whiskers plot

stem mpg
return stem-and-leaf display of mpg

r

summarize price mpg, **detail** — frequently used commands are highlighted in yellow
calculate various univariate summary statistics

ci mean mpg price, **level**(99) — for Stata 13: **ci** mpg price, **level** (99)
compute standard errors and confidence intervals

correlate mpg price
return correlation or covariance matrix

pwcorr price mpg weight, **star**(0.05)
return all pairwise correlation coefficients with sig. levels

e

mean price mpg
estimates of means, including standard errors

proportion rep78 foreign
estimates of proportions, including standard errors for categories identified in varlist

ratio price mpg
estimates of ratio, including standard errors

total price
estimates of totals, including standard errors

Declare data

By declaring data type, you enable Stata to apply data munging and analysis functions specific to certain data types

Time series

webuse sunspot, clear

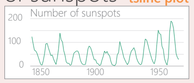
tsset time, **yearly**
declare sunspot data to be yearly time series

r

tsreport
report time-series aspects of a dataset

generate lag_spot = L1.spot
create a new variable of annual lags of sunspots

tsline plot



e

tsline spot
plot time series of sunspots

arima spot, **ar(**1/2**)**
fit an autoregressive model with 2 lags

Time-series operators

L.	lag x_{t-1}	L2.	2-period lag x_{t-2}
F.	lead x_{t+1}	F2.	2-period lead x_{t+2}
D.	difference $x_t - x_{t-1}$	D2.	difference of difference $x_t - x_{t-1} - (x_{t-1} - x_{t-2})$
S.	seasonal difference $x_t - x_{t-1}$	S2.	lag-2 (seasonal difference) $x_t - x_{t-2}$

Useful add-ins

tscollap	compact time series into means, sums, and end-of-period values
carryforward	carry nonmissing values forward from one obs. to the next
tsspell	identify spells or runs in time series

Survival analysis

webuse drugtr, clear

r

stset studytime, **failure(**died**)**
declare survey design for a dataset

stsum
summarize survival-time data

e

stcox drug age
fit a Cox proportional hazards model

Panel / longitudinal

webuse nlswork, clear

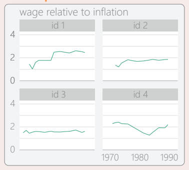
xtset id year
declare national longitudinal data to be a panel

r

xtdescribe
report panel aspects of a dataset

xtsum hours
summarize hours worked, decomposing standard deviation into between and within components

xtline plot



xtline ln_wage if id <= 22, **tlabel**(#3)
plot panel data as a line plot

e

xtreg ln_w c.age##c.age ttl_exp, **fe vce**(robust)
fit a fixed-effects model with robust standard errors

Survey data

webuse nhanes2b, clear

svyset psuid **[pweight** = finalwgt], **strata**(stratid)
declare survey design for a dataset

r

svydescribe
report survey data details

svy: mean age, **over**(sex)
estimate a population mean for each subpopulation

svy, subpop(rural)**:** mean age
estimate a population mean for rural areas

e

svy: tabulate sex heartatk
report two-way table with tests of independence

svy: reg zinc c.age##c.age female weight rural
estimate a regression using survey weights

Statistical tests

tabulate foreign rep78, **chi2 exact expected**
tabulate foreign and repair record and return χ^2 and Fisher's exact statistic alongside the expected values

ttest mpg, **by**(foreign)
estimate *t* test on equality of means for mpg by foreign

r

prtest foreign == 0.5
one-sample test of proportions

ksmirnov mpg, **by**(foreign) **exact**
Kolmogorov–Smirnov equality-of-distributions test

ranksum mpg, **by**(foreign)
equality tests on unmatched data (independent samples)

anova systolic drug — **webuse** systolic, clear
analysis of variance and covariance

e

pwmean mpg, **over**(rep78) **pveffects mcompare**(tukey)
estimate pairwise comparisons of means with equal variances include multiple comparison adjustment

1 Fit models

stores results as e-class

regress price mpg weight, **vce(**robust**)**
fit ordinary least-squares (OLS) model on mpg, weight, and foreign, apply robust standard errors

regress price mpg weight **if** foreign == 0, **vce(**cluster rep78**)**
regress price only on domestic cars, cluster standard errors

rreg price mpg weight, **genwt**(reg_wt)
estimate robust regression to eliminate outliers

probit foreign turn price, **vce**(robust)
estimate probit regression with robust standard errors

logit foreign headroom mpg, **or**
estimate logistic regression and report odds ratios

bootstrap, reps(100)**: regress** mpg /* */ weight gear foreign
estimate regression with bootstrapping

jackknife r(mean): sum mpg
jackknife standard error of sample mean

Additional models

pca ← built-in Stata command; user-written → ivreg2 (ssc install ivreg2)

pca	principal components analysis
factor	factor analysis
poisson • **nbreg**	count outcomes
tobit	censored data
ivregress **ivreg2**	instrumental variables
didregress	difference in differences
rd	regression discontinuity
xtabond **xtdpdsys**	dynamic panel estimator
teffects psmatch	propensity-score matching
synth	synthetic control analysis
oaxaca	Blinder–Oaxaca decomposition

2 Diagnostics

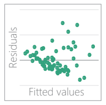
some are inappropriate with robust SEs

r

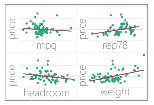
estat	**hettest**	test for heteroskedasticity
	ovtest	test for omitted-variable bias
	vif	report variance inflation factor

dfbeta(length)
calculate measure of influence

Type help regress postestimation plots for additional diagnostic plots



rvfplot, yline(0)
plot residuals against fitted values



avplots
plot all partial-regression leverage plots in one graph

3 Postestimation

commands that use a fitted model

regress price headroom length — Used in all postestimation examples

display _b[length] **display** _se[length]
return coefficient estimate or standard error for length from most recent regression model

r

margins, dydx(length) — returns e-class information when post option is used
return the estimated marginal effect for length

margins, eyex(length)
return the estimated elasticity for length

predict yhat if **e(**sample**)**
create predictions for sample on which model was fit

predict double resid, **residuals**
calculate residuals based on last fitted model

r

test headroom = 0
test linear hypotheses that headroom estimate equals zero

lincom headroom - length
estimate linear combination (headroom - length)

Estimation with categorical & factor variables

more details at https://www.stata.com/manuals/u26.pdf

Continuous variables — measure something

Categorical variables ■ ● ▲ — identify a group to which an observation belongs

Indicator variables T F — denote whether something is true or false

Operator	Description	Example	
i.	specify indicators	regress price **i.**rep78	specify rep78 variable to be an indicator variable
ib.	specify base indicator	regress price **ib(**3**).**rep78	set the third category of rep78 to be the base category
fvset	command to change base	fvset base frequent rep78	set the base to most frequently occurring category for rep78
c.	treat variable as continuous	regress price i.foreign#**c.**mpg i.foreign	treat mpg as a continuous variable and specify an interaction between foreign and mpg
o.	omit a variable or indicator	regress price **io(**2**).**rep78	set rep78 as an indicator; omit observations with rep78 == 2
#	specify interactions	regress price mpg c.mpg**#**c.mpg	create a squared mpg term to be used in regression
##	specify factorial interactions	regress price c.mpg**##**c.mpg	create all possible interactions with mpg (mpg and mpg²)

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Programming with Stata Cheat Sheet

For more info, see Stata's reference manual (stata.com)

1 Scalars
both r- and e-class results contain scalars

scalar x1 = 3
create a scalar x1 storing the number 3

scalar a1 = "I am a string scalar"
create a scalar a1 storing a string

Scalars can hold numeric values or arbitrarily long strings

2 Matrices
e-class results are stored as matrices

matrix a = (4\ 5\ 6)
create a 3 x 1 matrix

matrix b = (7, 8, 9)
create a 1 x 3 matrix

matrix d = b' transpose matrix b; store in d

matrix ad1 = a \ d
row bind matrices

matrix ad2 = a , d
column bind matrices

matselrc b x, c(1 3) search matselrc
select columns 1 & 3 of matrix b & store in new matrix x

mat2txt, matrix(ad1) **saving**(textfile.txt) **replace**
export a matrix to a text file ssc install mat2txt

Displaying & deleting building blocks

[**scalar** | **matrix** | **macro** | **estimates**] [**list** | **drop**] b
list contents of object b or drop (delete) object b

[**scalar** | **matrix** | **macro** | **estimates**] **dir**
list all defined objects for that class

matrix list b
list contents of matrix b

matrix dir
list all matrices

scalar drop x1
delete scalar x1

3 Macros
public or private variables storing text

Globals
available through Stata sessions — Public

global pathdata "C:/Users/SantasLittleHelper/Stata"
define a global variable called pathdata

cd $pathdata — add a $ before calling a global macro
change working directory by calling global macro

global myGlobal price mpg length
summarize $myGlobal
summarize price mpg length using global

Locals
available only in programs, loops, or do-files — Private

local myLocal price mpg length
create local variable called myLocal with the strings price, mpg, and length

summarize `myLocal' add a ` before and a ' after local macro name to call
summarize contents of local myLocal

levelsof rep78, **local**(levels)
create a sorted list of distinct values of rep78, store results in a local macro called levels

local varLab: **variable label** foreign can also do with value labels
store the variable label for foreign in the local varLab

Tempvars & tempfiles
special locals for loops/programs

tempvar temp1 — initialize a new temporary variable called temp1
generate `temp1' = mpg^2 — save squared mpg values in temp1
summarize `temp1' — summarize the temporary variable temp1

tempfile myAuto
save `myAuto'
create a temporary file to be used within a program
see also **tempname**

Building blocks
basic components of programming

R- and e-class: Stata stores calculation results in two* main classes:

r — return results from general commands such as **summarize** or **tabulate**

e — return results from estimation commands such as **regress** or **mean**

To assign values to individual variables, use:

1 Scalars — r — individual numbers or strings
2 Matrices — e — rectangular array of quantities or expressions
3 Macros — e — pointers that store text (global or local)

* there's also s- and n-class

4 Access & save stored r- and e-class objects

Many Stata commands store results in types of lists. To access these, use **return** or **ereturn** commands. Stored results can be scalars, macros, matrices, or functions.

summarize price, detail
r **return** list
returns a list of scalars

```
scalars:
      r(N)     =  74
      r(mean)  =  6165.25...
      r(Var)   =  86995225.97...
      r(sd)    =  2949.49...
      ...
```

mean price
e **ereturn** list
returns a list of scalars, macros, matrices, and functions

```
scalars:
      e(df_r)    =  73
      e(N_over)  =  1
      e(N)       =  73
      e(k_eq)    =  1
      e(rank)    =  1
```

Results are replaced each time an r-class / e-class command is called

generate p_mean = r(mean)
create a new variable equal to average of price

generate meanN = e(N)
create a new variable equal to obs. in estimation command

preserve create a temporary copy of active dataframe
restore restore temporary copy to point last preserved
set restore points to test code that changes data

Accessing estimation results

After you run any estimation command, the results of the estimates are stored in a structure that you can save, view, compare, and export.

regress price weight
estimates store est1
store previous estimation results est1 in memory

Use **estimates store** to compile results for later use

regress price weight mpg
estimates store est2
regress price weight mpg foreign
estimates store est3
fit two regression models and store estimation results

etable, estimates(est1 est2 est3) **column**(index) /*
*/ **showstars showstarsnote**
print a table of the three estimation results

Exporting results

etable, estimates(est1 est2 est3) **column**(index) /*
*/ **showstars showstarsnote export**(autoreg.txt)
export table to a text file

The collect suite of commands allows further customization of tables. Also see **putdocx** and **putexcel** for exporting tables, images, and text.

Additional programming resources

bit.ly/statacode
download all examples from this cheat sheet in a do-file

ado update
Update user-written ado-files

adolist ssc install **adolist**
List/copy user-written ado-files

net install package, from (https://raw.githubusercontent.com/username/repo/master)
install a package from a Github repository

https://github.com/andrewheiss/SublimeStataEnhanced
configure Sublime text for Stata 11–15

Loops: Automate repetitive tasks

Anatomy of a loop
see also **while**

Stata has three options for repeating commands over lists or values: **foreach**, **forvalues**, and **while**. Though each has a different first line, the syntax is consistent:

```
foreach x of varlist var1 var2 var3 {
    command `x', option
    ...
}
```

- objects to repeat over
- temporary variable used only within the loop
- open brace must appear on first line
- requires local macro notation
- command(s) you want to repeat can be one line or many
- close brace must appear on final line by itself

Foreach: repeat commands over strings, lists, or variables

foreach x in|of [local, global, varlist, newlist, numlist] {
Stata commands referring to `x'
}

list types: objects over which the commands will be repeated

loops repeat the same command over different arguments:

Strings

```
foreach x in auto.dta auto2.dta {
    sysuse "`x'", clear
    tab rep78, missing
}
```

same as...

```
sysuse "auto.dta", clear
tab rep78, missing
sysuse "auto2.dta", clear
tab rep78, missing
```

Lists

```
foreach x in "Dr. Nick" "Dr. Hibbert" {
    display length ( "`x'" )
}
```

```
display length("Dr. Nick")
display length("Dr. Hibbert")
```

When calling a command that takes a string, surround the macro name with quotes.

Variables

```
foreach x in mpg weight {
    summarize `x'
}
```

```
foreach x of varlist mpg weight {
    summarize `x'
}
```

must define list type

- **foreach in** takes any list as an argument with elements separated by spaces
- **foreach of** requires you to state the list type, which makes it faster

```
summarize mpg
summarize weight
```

Forvalues: repeat commands over lists of numbers

```
forvalues i = 10(10)50 {
    display `i'
}
```

iterator; numeric values over which loop will run

Use display command to show the iterator value at each step in the loop

```
display 10
display 20
...
```

Iterators

i = 10/50 →	10, 11, 12, ...
i = 10(10)50	10, 20, 30, ...
i = 10 20 to 50	10, 20, 30, ...

Debugging code

set trace on (off)
trace the execution of programs for error checking

see also **capture** and scalar _rc

Putting it all together
sysuse auto, clear

generate car_make = **word**(make, 1) — pull out the first word from the make variable
levelsof car_make, **local**(cmake) — calculate unique groups of car_make and store in local cmake
local i = 1 — define the local i to be an iterator
local cmake_len : word **count** `cmake' — store the length of local cmake in local cmake_len
foreach x of **local** cmake {
  display in yellow "Make group `i' is `x'"
  if `i' == `cmake_len' {
    display "The total number of groups is `i'"
  }
  local i = `++i' — increment iterator by one
}

tests the position of the iterator, executes contents in brackets when the condition is true

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Data Processing with Stata Cheat Sheet

For more info, see Stata's reference manual (stata.com)

Useful shortcuts

Note: not applicable with Stata for Mac.

F2 — keyboard buttons
describe data

Ctrl + **9**
open a new do-file

Ctrl + **8**
open the Data Editor

Ctrl + **D**
highlight text in do-file, then ctrl + d executes it in the command line

clear
delete data in memory

At command prompt

PgUp **PgDn** scroll through previous commands

Tab autocompletes variable name after typing part

cls clear the console (where results are displayed)

Setup

pwd
print current (working) directory

cd "C:\Program Files\Stata18"
change working directory

dir
display filenames in working directory

dir *.dta
List all Stata data in working directory

capture log close
close the log on any existing do-files

underlined parts are shortcuts – use "capture" or "cap"

log using "myDoFile.txt", **replace**
create a new log file to record your work and results

search mdesc
find the package mdesc to install

packages contain extra commands that expand Stata's toolkit

ssc install mdesc
install the package mdesc; needs to be done once

Import data

sysuse auto, clear
load system data (auto data)

for many examples, we use the auto dataset.

use "yourStataFile.dta", **clear**
load a dataset from the current directory

frequently used commands are highlighted in yellow

import excel "yourSpreadsheet.xlsx", /*
*/ **sheet**("Sheet1") **cellrange**(A2:H11) **firstrow**

import delimited "yourFile.csv", /*
*/ **rowrange**(2:11) **colrange**(1:8) **varnames**(2)

import sas "yourSASfile.sas7bdat", **bcat**("value labels file")

import spss "yourSPSSfile.sav"

see **help import** for more options

webuse set "https://github.com/GeoCenter/StataTraining/raw/master/Day2/Data"
webuse "wb_indicators_long"
set web-based directory and load data from the web

Basic syntax

All Stata commands have the same format (syntax):

[**by** varlist1**:**]	*command*	[varlist2]	[=*exp*]	[*if exp*]	[**in** range]	[weight]	[**using** filename]	[,*options*]
apply the *command* across each unique combination of variables in *varlist1*	function: what are you going to **do** to *varlists*?	column to apply *command* to	save output as a new variable	condition: only apply the function *if* something is true	apply to specific rows	apply weights	pull data from a file (if not loaded)	special options for *command*

bysort rep78 : summarize price if foreign == 0 & price <= 9000, detail

In this example, we want a ***detailed*** summary with stats like kurtosis, plus mean and median

To find out more about any command–like what options it takes–type **help *command***

Basic data operations

Arithmetic

+	add (numbers) combine (strings)
−	subtract
*****	multiply
/	divide
^	raise to a power

Logic

== tests if something is equal
= assigns a value to a variable

&	and	**==**	equal	**<**	less than
! or **~**	not	**!=** or **~=**	not equal	**<=**	less than or equal to
|	or			**>**	greater than
				>=	greater or equal to

if foreign != 1 & price >= 10000

make	foreign	price
Chevy Colt	0	3,984
Buick Riviera	0	10,372
Honda Civic	1	4,499
Volvo 260	1	11,995

if foreign != 1 | price >= 10000

make	foreign	price
Chevy Colt	0	3,984
Buick Riviera	0	10,372
Honda Civic	1	4,499
Volvo 260	1	11,995

Explore data

View data organization

describe make price
display variable type, format, and any value/variable labels

count
count if price > 5000
number of rows (observations) can be combined with logic

ds, has(type string)
lookfor "in."
search for variable types, variable name, or variable label

isid mpg
check if mpg uniquely identifies the data

See data distribution

codebook make price
overview of variable type, stats, number of missing/unique values

summarize make price mpg
print summary statistics (mean, stdev, min, max) for variables

inspect mpg
show histogram of data and number of missing or zero observations

histogram mpg, **frequency**
plot a histogram of the distribution of a variable

Browse observations within the data

browse
open the Data Editor

Missing values are treated as the largest positive number. To exclude missing values, ask whether the value is less than "."

list make price **if** price > 10000 & !**missing**(price)
list the make and price for observations with price > $10,000

clist ... (compact form)

display price[4]
display the 4th observation in price; only works on single values

gsort price mpg (ascending) **gsort** –price –mpg (descending)
sort in order, first by price then miles per gallon

duplicates report
finds all duplicate values in each variable

assert price!=.
verify truth of claim

levelsof rep78
display the unique values for rep78

Change data types

Stata has six data types, and data can also be missing:

no data	true/false	words	numbers
missing	**byte**	**string**	**int long float double**

To convert between numbers and strings:

1 → "1"
gen foreignString = **string**(foreign)
tostring foreign, **gen**(foreignString)
decode foreign , **gen**(foreignString)
"1" "1" "foreign"

1 ← "1"
gen foreignNumeric = **real**(foreignString)
destring foreignString, **gen**(foreignNumeric)
encode foreignString, **gen**(foreignNumeric)
"1" "1" "foreign"

recast double mpg
generic way to convert between types

Summarize data

include missing values

create binary variable for every rep78 value in a new variable, repairRecord

tabulate rep78, **mi gen**(repairRecord)
one-way table: number of rows with each value of rep78

tabulate rep78 foreign, **mi**
two-way table: cross-tabulate number of observations for each combination of rep78 and foreign

bysort rep78**: tabulate** foreign
for each value of rep78, apply the command **tabulate** foreign

table (foreign **result)** (), **stat(mean** price mpg) /*
*/ **stat(n** price mpg) **nformat(**%6.1f **mean)**
create compact table of summary statistics

collect export table1.html
export table of summary statistics

dtable price mpg i.rep78, **export(**table1.pdf)
create and export table of descriptive statistics

Create new variables

generate mpgSq = mpg^2 **gen byte** lowPr = price < 4000
create a new variable. Useful also for creating binary variables based on a condition (**generate byte**)

generate id = **_n** **bysort** rep78**: gen** repairIdx = **_n**
_n creates a running index of observations in a group

generate totRows = **_N** **bysort** rep78**: gen** repairTot = **_N**
_N creates a running count of the total observations per group

pctile mpgQuartile = mpg, **nq(**4)
create quartiles of the mpg data

egen meanPrice = **mean(**price), **by(**foreign)
calculate mean price for each group in foreign

see **help egen** for more options

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Data Transformation with Stata Cheat Sheet

For more info, see Stata's reference manual (stata.com)

Select parts of data (subsetting)

Select specific columns

drop make
remove the 'make' variable

keep make price
opposite of drop; keep only variables 'make' and 'price'

Filter specific rows

drop if mpg < 20 **drop in** 1/4
drop observations based on a condition (left) or rows 1–4 (right)

keep in 1/30
opposite of drop; keep only rows 1–30

keep if inrange(price, 5000, 10000)
keep values of price between $5,000–$10,000 (inclusive)

keep if inlist(make, "Honda Accord", "Honda Civic", "Subaru"**)**
keep the specified values of make

sample 25
sample 25% of the observations in the dataset (use **set seed** # command for reproducible sampling)

Replace parts of data

Change column names

rename (rep78 foreign) (repairRecord carType)
rename one or multiple variables

Change row values

replace price = 5000 **if** price < 5000
replace all values of price that are less than $5,000 with 5000

recode price (0 / 5000 = 5000)
change all prices less than 5000 to be $5,000

recode foreign (0 = 2 "US")(1 = 1 "Not US"), **gen(**foreign2**)**
change the values and value labels then store in a new variable, foreign2

Replace missing values

mvdecode _all, **mv(**9999**)** useful for cleaning survey datasets
replace the number 9,999 with missing value in all variables

mvencode _all, **mv(**9999**)** useful for exporting data
replace missing values with the number 9,999 for all variables

Label data

Value labels map string descriptions to numbers. They allow the underlying data to be numeric (making logical tests simpler) while also connecting the values to human-understandable text.

label define myLabel 0 "US" 1 "Not US"
label values foreign myLabel
define a label and apply it to the values in foreign

label list
list all labels within the dataset

note: data note here
place note in dataset

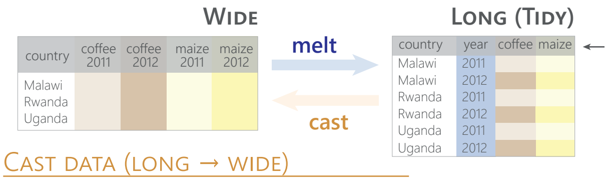
Reshape data

webuse set https://github.com/GeoCenter/StataTraining/raw/master/Day2/Data
webuse "coffeeMaize.dta" load demo dataset

Melt data (wide → long)

reshape variables starting with coffee and maize | unique id variable (key) | create new variable that captures the info in the column names

reshape long coffee@ maize@, **i(**country**) j(**year**)** — new variable
convert a wide dataset to long



Tidy Datasets have each observation in its own row and each variable in its own column.

When datasets are tidy, they have a consistent, standard format that is easier to manipulate and analyze.

Cast data (long → wide)

create new variables named coffee2011, maize2012... | what will be unique id variable (key) | create new variables with the year added to the column name

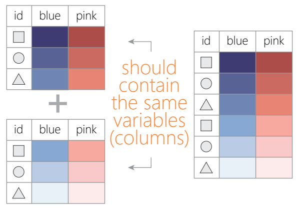
reshape wide coffee maize, **i(**country**) j(**year**)**
convert a long dataset to wide

xpose, clear varname
transpose rows and columns of data, clearing the data and saving old column names as a new variable called "_varname"

Combine data

Adding (appending) new data

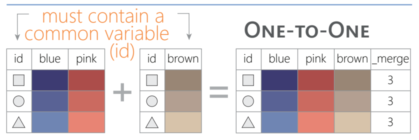
see **help frames** for using multiple datasets



webuse coffeeMaize2.dta, **clear**
save coffeeMaize2.dta, **replace**
webuse coffeeMaize.dta, **clear** load demo data

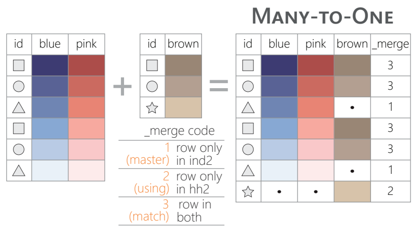
append using "coffeeMaize2.dta", **gen(**filenum**)**
add observations from "coffeeMaize2.dta" to current data and create variable "filenum" to track the origin of each observation

Merging two datasets together



webuse ind_age.dta, **clear**
save ind_age.dta, **replace**
webuse ind_ag.dta, **clear**

merge 1:1 id **using** "ind_age.dta"
one-to-one merge of "ind_age.dta" into the loaded dataset and create variable "_merge" to track the origin



webuse hh2.dta, **clear**
save hh2.dta, **replace**
webuse ind2.dta, **clear**

merge m:1 hid **using** "hh2.dta"
many-to-one merge of "hh2.dta" into the loaded dataset and create variable "_merge" to track the origin

Fuzzy matching: combining two datasets without a common ID

reclink match records from different datasets using probabilistic matching ssc install reclink

jarowinkler create distance measure for similarity between two strings ssc install jarowinkler

Manipulate strings

Get string properties

display length("This string has 29 characters"**)**
return the length of the string

charlist make * user-defined package
display the set of unique characters within a string

display strpos("Stata", "a"**)**
return the position in Stata where a is first found

Find matching strings

display strmatch("123.89", "1??.?9"**)**
return true (1) or false (0) if string matches pattern

display substr("Stata", 3, 5**)**
return string of 5 characters starting with position 3

list make **if regexm(**make, "[0-9]"**)**
list observations where make matches the regular expression (here records that contain a number)

list if regexm(make, "(Cad.|Chev.|Datsun)"**)**
return all observations where make contains "Cad.", "Chev." or "Datsun"

compare the given list against the first word in make

list if inlist(word(make, 1**)**, "Cad.", "Chev.", "Datsun"**)**
return all observations where the first word of the make variable contains the listed words

Transform strings

display regexr("My string", "My", "Your"**)**
replace string1 ("My") with string2 ("Your")

replace make **= subinstr(**make, "Cad.", "Cadillac", 1**)**
replace first occurrence of "Cad." with Cadillac in the make variable

display stritrim(" Too much   Space"**)**
replace consecutive spaces with a single space

display trim("   leading / trailing spaces   "**)**
remove extra spaces before and after a string

display strlower("STATA should not be ALL-CAPS"**)**
change string case; see also **strupper**, **strproper**

display strtoname("1Var name"**)**
convert string to Stata-compatible variable name

display real("100"**)**
convert string to a numeric or missing value

Save & export data

compress
compress data in memory

save "myData.dta", **replace** Stata 12-compatible file
saveold "myData.dta", **replace version(**12**)**
save data in Stata format, replacing the data if a file with same name exists

export excel "myData.xls", /*
*/ **firstrow(variables) replace**
export data as an Excel file (.xls) with the variable names as the first row

export delimited "myData.csv", **delimiter(**","**) replace**
export data as a comma-delimited file (.csv)

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geocenter.github.io/StataTraining

updated April 2023
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Data Visualization with Stata Cheat Sheet

For more info, see Stata's reference manual (stata.com)

Basic plot syntax:

graph <plot type> y_1 y_2 … y_n x **[in]** **[if],** <plot options> **by(var)** **xline(**xint**)** **yline(**yint**)** **text(**y x "annotation"**)**

(variables: y first — plot-specific options — facet — annotations)

titles: **title(**"title"**)** **subtitle(**"subtitle"**)** **xtitle(**"x-axis title"**)** **ytitle(**"y axis title"**)**

axes: **xscale(range(**low high**)** **log reverse off noline)** **yscale(**<options>**)**

custom appearance: <marker, line, text, axis, legend, background options> **scheme(**s1mono**)** **play(**customTheme**)**

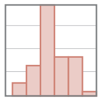
plot size: **xsize(**5**)** **ysize(**4**)**

save: **saving(**"myPlot.gph"**, replace)**

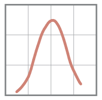
One variable

sysuse auto, clear

Continuous



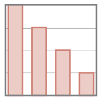
histogram mpg, **width(**5**)** **freq** **kdensity** **kdenopts(bwidth(**5**))**
histogram
bin(#) • width(#) • density • fraction • frequency • percent • addlabels
addlabopts(<options>) • normal • normopts(<options>) • kdensity
kdenopts(<options>)



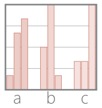
kdensity mpg, **bwidth(**3**)**
smoothed histogram
bwidth • kernel(<options>)
normal • normopts(<line options>)

← main plot-specific options; see help for complete set

Discrete

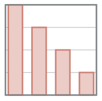


graph bar (count**), over(**foreign, **gap(***0.5**))** **intensity(***0.5**)**
bar plot — **graph hbar** draws horizontal bar charts
(asis) • (percent) • (count) • over(<variable>, <options: gap(*#) •
relabel • descending • reverse>) • cw • missing • nofill • allcategories •
percentages • stack • bargap(#) • intensity(*#) • yalternate • xalternate

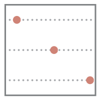


graph bar (percent**), over(**rep78**)** **over(**foreign**)**
grouped bar plot — **graph hbar** …
(asis) • (percent) • (count) • over(<variable>, <options: gap(*#) •
relabel • descending • reverse>) • cw • missing • nofill • allcategories •
percentages • stack • bargap(#) • intensity(*#) • yalternate • xalternate

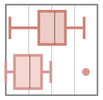
Discrete X, continuous Y



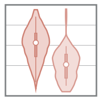
graph bar (median**)** price**, over(**foreign**)** — **graph hbar** …
bar plot (asis) • (percent) • (count) • (stat: mean median sum min max ...)
over(<variable>, <options: gap(*#) • relabel • descending • reverse
sort(<variable>)>) • cw • missing • nofill • allcategories • percentages
stack • bargap(#) • intensity(*#) • yalternate • xalternate



graph dot (mean**)** length headroom**, over(**foreign**)** **m(**1, ms(S)**)**
dot plot (asis) • (percent) • (count) • (stat: mean median sum min max ...)
over(<variable>, <options: gap(*#) • relabel • descending • reverse
sort(<variable>)>) • cw • missing • nofill • allcategories • percentages
linegap(#) • marker(#, <options>) • linetype(dot | line | rectangle)
dots(<options>) • lines(<options>) • rectangles(<options>) • rwidth



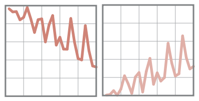
graph hbox mpg**, over(**rep78, descending**)** **by(**foreign**)** **missing**
box plot — **graph box** draws vertical boxplots
over(<variable>, <options: total • gap(*#) • relabel • descending • reverse
sort(<variable>)>) • missing • allcategories • intensity(*#) • boxgap(#)
medtype(line | line | marker) • medline(<options>) • medmarker(<options>)



vioplot price**, over(**foreign**)** — ssc install vioplot
violin plot over(<variable>, <options: total • missing>) • nofill •
vertical • horizontal • obs • kernel(<options>) • bwidth(#) •
barwidth(#) • dscale(#) • ygap(#) • ogap(#) • density(<options>)
bar(<options>) • median(<options>) • obsopts(<options>)

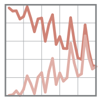
Plot placement

Juxtapose (facet)



twoway scatter mpg price, **by(foreign, norescale)**
total • missing • colfirst • rows(#) • cols(#) • holes(<numlist>)
compact • [no]edgelabel • [no]rescale • [no]yrescal • [no]xrescale
[no]iyaxes • [no]ixaxes • [no]iytick • [no]ixtick • [no]iylabel
[no]ixlabel • [no]iytitle • [no]ixtitle • imargin(<options>)

Superimpose

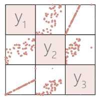


graph combine plot1.gph plot2.gph...
combine two or more saved graphs into one plot

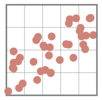
scatter y3 y2 y1 x, msymbol(i o i) mlabel(var3 var2 var1)
plot several *y* values for one *x* value

```
graph twoway scatter mpg price in 27/74 || scatter mpg price /*
 */ if mpg < 15  & price > 12000 in 27/74, mlabel(make) m(i)
```
combine two-way plots using ||

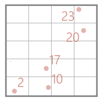
Two+ continuous variables



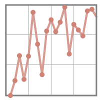
graph matrix mpg price weight**, half**
scatterplot of each combination of variables
half • jitter(#) • jitterseed(#)
diagonal • [aweights(<variable>)]



twoway scatter mpg weight**, jitter(**7**)**
scatterplot
jitter(#) • jitterseed(#) • sort • cmissing(yes | no)
connect(<options>) • [aweight(<variable>)]

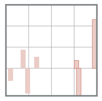


twoway scatter mpg weight**, mlabel(**mpg**)**
scatterplot with labeled values
jitter(#) • jitterseed(#) • sort • cmissing(yes | no)
connect(<options>) • [aweight(<variable>)]

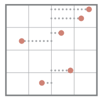


twoway connected mpg price**, sort(**price**)**
scatterplot with connected lines and symbols — see also **line**
jitter(#) • jitterseed(#) • sort
connect(<options>) • cmissing(yes | no)

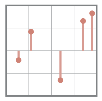
twoway area mpg price**, sort(**price**)**
line plot with area shading
sort • cmissing(yes | no) • vertical, • horizontal
base(#)



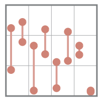
twoway bar price rep78
bar plot
vertical, • horizontal • base(#) • barwidth(#)



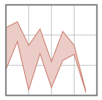
twoway dot mpg rep78
dot plot vertical, • horizontal • base(#) • ndots(#)
dcolor(<color>) • dfcolor(<color>) • dlcolor(<color>)
dsize(<markersize>) • dsymbol(<marker type>)
dlwidth(<strokesize>) • dotextend(yes | no)



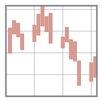
twoway dropline mpg price **in** 1/5
dropped line plot
vertical, • horizontal • base(#)



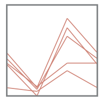
twoway rcapsym length headroom price
range plot (y_1 ÷ y_2) with capped lines — see also **rcap**
vertical • horizontal



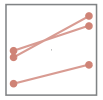
twoway rarea length headroom price**, sort**
range plot (y_1 ÷ y_2) with area shading
vertical • horizontal • sort
cmissing(yes | no)



twoway rbar length headroom price
range plot (y_1 ÷ y_2) with bars
vertical • horizontal • barwidth(#) • mwidth
msize(<marker size>)

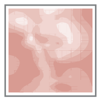


twoway pcspike wage68 ttl_exp68 wage88 ttl_exp88 — **(sysuse nlswide1)**
Parallel coordinates plot
vertical, • horizontal

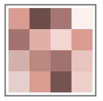


twoway pccapsym wage68 ttl_exp68 wage88 ttl_exp88 — **(sysuse nlswide1)**
Slope/bump plot
vertical • horizontal • headlabel

Three variables

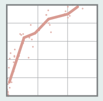


twoway contour mpg price weight**, level(**20**)** **crule(**intensity**)**
3D contour plot
ccuts(#s) • levels(#) • minmax • crule(hue | chue | intensity | linear) •
scolor(<color>) • ecolor (<color>) • ccolors(<colorlist>) • heatmap
interp(thinplatespline | shepard | none)

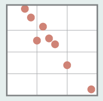


regress price mpg trunk weight length turn**, nocons**
matrix regmat = **e(V)** — ssc install plotmatrix
plotmatrix, mat(regmat**)** **color(**green**)**
heatmap mat(<variable>) • split(<options>) • color(<color>) • freq

Summary plots

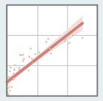


twoway mband mpg weight **|| scatter** mpg weight
plot median of the y values
bands(#)

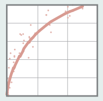


binscatter weight mpg**, line(**none**)** — ssc install binscatter
plot one value (mean or median) for each x value
medians • nquantiles(#) • discrete • controls(<variables>) •
linetype(lfit | qfit | connect | none) • aweight[<variable>]

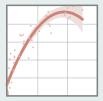
Fitting results



twoway lfitci mpg weight **|| scatter** mpg weight
calculate and plot linear fit to data with confidence intervals
level(#) • stdp • stdf • nofit • fitplot(<plottype>) • ciplot(<plottype>) •
range(# #) • n(#) • atobs • estopts(<options>) • predopts(<options>)

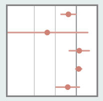


twoway lowess mpg weight **|| scatter** mpg weight
calculate and plot lowess smoothing
bwidth(#) • mean • noweight • logit • adjust

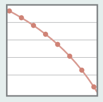


twoway qfitci mpg weight**, alwidth(**none**)** **|| scatter** mpg weight
calculate and plot quadriatic fit to data with confidence intervals
level(#) • stdp • stdf • nofit • fitplot(<plottype>) • ciplot(<plottype>) •
range(# #) • n(#) • atobs • estopts(<options>) • predopts(<options>)

Regression results



regress price mpg headroom trunk length turn
coefplot, drop(_cons**)** **xline(**0**)** — ssc install coefplot
Plot regression coefficients
baselevels • b(<options>) • at(<options>) • noci • levels(#)
keep(<variables>) • drop(<variables>) • rename(<list>)
horizontal • vertical • generate(<variable>)



regress mpg weight length turn
margins, eyex(weight**)** **at(**weight = (1800(200)4800)**)**
marginsplot, noci
Plot marginal effects of regression
horizontal • noci

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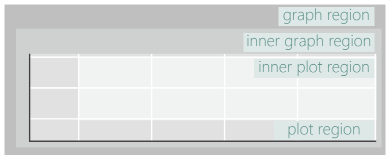
geocenter.github.io/StataTraining

updated April 2023

Plotting in Stata
Customizing Appearance

For more info, see Stata's reference manual (stata.com)

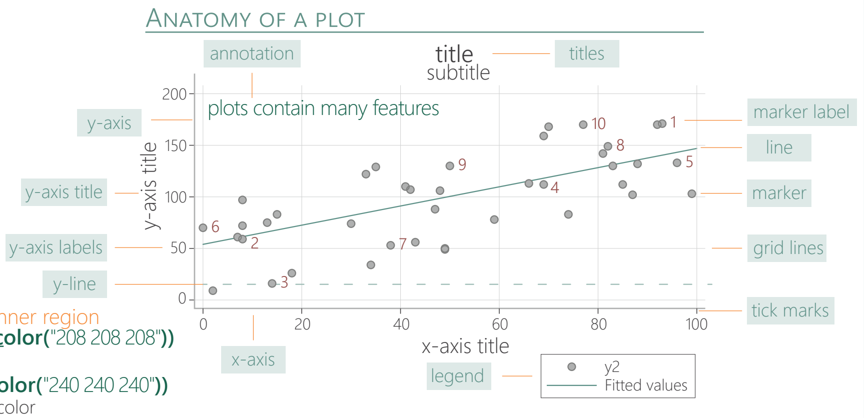


outer region · inner region

scatter price mpg, **graphregion(fcolor(**"192 192 192"**) ifcolor(**"208 208 208"**))**
specify the fill of the background in RGB or with a Stata color

scatter price mpg, **plotregion(fcolor(**"224 224 224"**) ifcolor(**"240 240 240"**))**
specify the fill of the plot background in RGB or with a Stata color

Anatomy of a plot



Symbols

Syntax

marker: <marker options>

arguments for the plot objects (in green) go in the options portion of these commands (in orange)

for example:
scatter price mpg, **xline**(20, **lwidth**(vthick))

Color

mcolor("145 168 208") **mcolor**(none)
specify the fill and stroke of the marker in RGB or with a Stata color

mfcolor("145 168 208") **mfcolor**(none)
specify the fill of the marker

Size / Thickness

msize(medium) specify the marker size:

ehuge, vhuge, huge, vlarge, large, medlarge, medium, medsmall, small, vsmall, tiny, vtiny

Appearance

msymbol(Dh) specify the marker symbol:

● O	◆ D	▲ T	■ S
● o	◆ d	▲ t	■ s
○ Oh	◇ Dh	△ Th	□ Sh
○ oh	◇ dh	△ th	□ sh
+ +	× X	· p	none i

Position

jitter(#)
randomly displace the markers

jitterseed(#)
set seed

Lines / Borders

Syntax

line: <line options>, xline(...), yline(...)
marker: <marker options>
axes: xscale(...), yscale(...)
tick marks
grid lines: xlabel(...), ylabel(...)
legend: legend(region(...))

Color

lcolor("145 168 208") **lcolor**(none)
specify the stroke color of the line or border

marker: **mlcolor**("145 168 208")
tick marks: **tlcolor**("145 168 208")
grid lines: **glcolor**("145 168 208")

Size / Thickness

lwidth(medthick)
specify the thickness (stroke) of a line:

marker: **mlwidth**(thin)
tick marks: **tlwidth**(thin)
grid lines: **glwidth**(thin)

vvvthick, vvthick, vthick, thick, medthick, medium, medthin, thin, vthin, vvthin, vvvthin, none

Appearance

line, axes: **lpattern**(dash)
grid lines: **glpattern**(dash)
specify the line pattern

solid, longdash, longdash_dot, dash, shortdash, shortdash_dot, dot, dash_dot, blank

axes: **noline**
axes: **off** no axis/labels
tick marks: **noticks**
tick marks: **tlength**(2)
grid lines: **nogrid** **nogmin** **nogmax**

Position

tick marks: **xlabel**(#10, **tposition**(crossing))
number of tick marks, position (outside | crossing | inside)

Text

Syntax

marker label: <marker options>
annotation: text(...)
titles: title(...), subtitle(...), xtitle(...), ytitle(...)
axis labels: xlabel(...), ylabel(...)
legend: legend(...)

Color

color("145 168 208") **color**(none)
specify the color of the text

marker label: **mlabcolor**("145 168 208")
axis labels: **labcolor**("145 168 208")

adjust transparency by adding %#
mcolor("145 168 208 %20")

Size / Thickness

size(medsmall) specify the size of the text:

marker label: **mlabsize**(medsmall)
axis labels: **labsize**(medsmall)

vhuge, huge, vlarge, large, medlarge, medium, medsmall, small, vsmall, tiny, half_tiny, third_tiny, quarter_tiny, minuscule

Appearance

marker label: **mlabel**(foreign)
label the points with the values of the foreign variable

axis labels: **nolabels**
no axis labels

axis labels: **format**(%12.2f)
change the format of the axis labels

legend: **off**
turn off legend

legend: **label**(# "label")
change legend label text

Position

marker label: **mlabposition**(5)
label location relative to marker (clock position: 0 – 12)

Apply themes

Schemes are sets of graphical parameters, so you don't have to specify the look of the graphs every time.

Using a saved theme

twoway scatter mpg price, **scheme**(customTheme)

Create custom themes by saving options in a .scheme file

help scheme entries
see all options for setting scheme properties

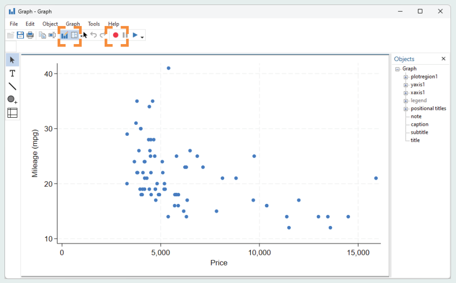
adopath ++ "~/<location>/StataThemes"
set path of the folder (StataThemes) where custom .scheme files are saved

set scheme customTheme, **permanently**
change the theme
set as default scheme

net inst brewscheme, from("https://wbuchanan.github.io/brewscheme/") replace
install William Buchanan's package to generate custom schemes and color palettes (including ColorBrewer)

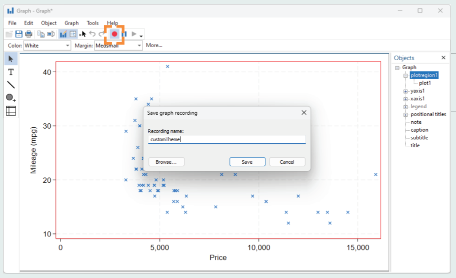
Using the graph editor

twoway scatter mpg price, **play**(graphEditorTheme)



Select the Graph Editor

Click Record



Double-click on symbols and areas on plot, or regions on sidebar to customize

Unclick Record

Save theme as a .grec file

Save plots

graph twoway scatter y x, saving("myPlot.gph"**) replace**
save the graph when drawing

graph save "myPlot.gph", **replace**
save current graph to disk

graph combine plot1.gph plot2.gph...
combine two or more saved graphs into one plot

graph export "myPlot.pdf", **as(.pdf)**
export the current graph as an image file
see options to set size and resolution

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geocenter.github.io/StataTraining

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