19　Immediate commands

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19.1　Overview

An *immediate* command is a command that obtains data not from the data stored in memory but from numbers typed as arguments. Immediate commands, in effect, turn Stata into a glorified hand calculator.

There are many instances when you may not have the data, but you do know something about the data, and what you know is adequate to perform statistical tests. For instance, you do not have to have individual-level data to obtain the standard error of the mean, and thereby a confidence interval, if you know the mean, standard deviation, and number of observations. In other instances, you may actually have the data, and you could enter the data and perform the test, but it would be easier if you could just ask for the statistic based on a summary. For instance, you flip a coin 10 times, and it comes up heads twice. You could enter a 10-observation dataset with two ones (standing for heads) and eight zeros (meaning tails).

Immediate commands are meant to solve those problems. Immediate commands have the following properties:

1. They never disturb the data in memory. You can perform an immediate calculation as an aside without changing your data.

2. The syntax for these commands is the same, the command name followed by numbers, which are the summary statistics from which the statistic is calculated. The numbers are almost always summary statistics, and the order in which they are specified is in some sense "natural".

3. Immediate commands all end in the letter *i*, although the converse is not true. Usually, if there is an immediate command, there is a nonimmediate form also, that is, a form that works on the data in memory. For every statistical command in Stata, we have included an immediate form if it is reasonable to assume that you might know the requisite summary statistics without having the underlying data and if typing those statistics is not absurdly burdensome.

4. Immediate commands are documented along with their nonimmediate counterparts. Thus, if you want to obtain a confidence interval, whether it be from summary data with an immediate command or using the data in memory, use the table of contents or index to discover that [R] **ci** discusses confidence intervals. There, you learn that `ci` calculates confidence intervals by using the data in memory and that `cii` does the same with the data specified immediately following the command.

19.1.1 Examples

▷ Example 1

Let's take the example of confidence intervals. Professional papers often publish the mean, standard deviation, and number of observations for variables used in the analysis. Those statistics are sufficient for calculating a confidence interval. If we know that the mean mileage rating of cars in some sample is 24, that the standard deviation is 6, and that there are 97 cars in the sample, we can calculate

```
. cii means 97 24 6
```

Variable	Obs	Mean	Std. err.	[95% conf. interval]
	97	24	.6092077	22.79073 25.20927

We learn that the mean's standard error is 0.61 and its 95% confidence interval is $[22.8, 25.2]$. To obtain this, we typed cii means (the immediate form of the ci means command) followed by the number of observations, the mean, and the standard deviation. We knew the order in which to specify the numbers because we had read [R] **ci**.

We could use the immediate form of the ttest command to test the hypothesis that the true mean is 22:

```
. ttesti 97 24 6 22
```

One-sample t test

	Obs	Mean	Std. err.	Std. dev.	[95% conf. interval]
x	97	24	.6092077	6	22.79073 25.20927

```
       mean = mean(x)                                         t =   3.2830
HO: mean = 22                               Degrees of freedom =       96

    Ha: mean < 22              Ha: mean != 22              Ha: mean > 22
 Pr(T < t) = 0.9993        Pr(|T| > |t|) = 0.0014        Pr(T > t) = 0.0007
```

The first three numbers were as we specified in the cii means command. ttesti requires a fourth number, which is the constant against which the mean is being tested; see [R] **ttest**.

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▷ Example 2

We mentioned flipping a coin 10 times and having it come up heads twice. We can use cii proportions to compute, for example, the 99% confidence interval:

```
. cii proportions 10 2, level(99)
```

Variable	Obs	Proportion	Std. err.	Binomial exact [99% conf. interval]
	10	.2	.1264911	.0108505 .6482012

The cii proportions command requires that we specify the number of trials and the number of successes from a binomial experiment; see [R] **ci**.

The immediate form of the `bitest` command performs exact hypothesis testing:

```
. bitesti 10 2 .5

Binomial probability test

            N   Observed k   Expected k   Assumed p   Observed p

           10            2            5     0.50000      0.20000
  Pr(k >= 2)              = 0.989258  (one-sided test)
  Pr(k <= 2)              = 0.054688  (one-sided test)
  Pr(k <= 2 or k >= 8) = 0.109375  (two-sided test)
```

For a full explanation of this output, see [R] **bitest**.

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▷ Example 3

Stata's `tabulate` command makes tables and calculates various measures of association. The immediate form, `tabi`, does the same, but we specify the contents of the table following the command:

```
. tabi 5 10 \ 2 14

             |          col
         row |         1          2  |     Total
-------------+----------------------+----------
           1 |         5         10  |        15
           2 |         2         14  |        16
-------------+----------------------+----------
       Total |         7         24  |        31

               Fisher's exact =                 0.220
       1-sided Fisher's exact =                 0.170
```

The `tabi` command is slightly different from most immediate commands because it uses '\' to indicate where one row ends and another begins.

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19.1.2   A list of the immediate commands

Command	Reference	Description
bitesti	[R] **bitest**	Binomial probability test
cci	[R] **Epitab**	Tables for epidemiologists
csi		
iri		
mcci		
cii	[R] **ci**	Confidence intervals for means, proportions, and variances
esizei	[R] **esize**	Effect size based on mean comparison
prtesti	[R] **prtest**	Tests of proportions
sdtesti	[R] **sdtest**	Variance comparison tests
symmi	[R] **symmetry**	Symmetry and marginal homogeneity tests
tabi	[R] **tabulate twoway**	Two-way tables of frequencies
ttesti	[R] **ttest**	t tests (mean-comparison tests)
twoway pci	[G-2] **graph twoway pci**	Paired-coordinate plot with spikes or lines
twoway pcarrowi	[G-2] **graph twoway pcarrowi**	Paired-coordinate plot with arrows
twoway scatteri	[G-2] **graph twoway scatteri**	Two-way scatterplot
ztesti	[R] **ztest**	z tests (mean-comparison tests, known variance)

19.2   The display command

display is not really an immediate command, but it can be used as a hand calculator.

```
. display 2+5
7
. display sqrt(2+sqrt(3^2-4*2*-2))/(2*3)
.44095855
```

See [R] **display**.

19.3   The power, precision, and sample-size commands

power, ciwidth, gsbounds, and gsdesign are not technically immediate commands because they do not do something on typed numbers that other commands do on the dataset. They do, however, work strictly on numbers you type on the command line and do not disturb the data in memory.

power and ciwidth perform power, precision, and sample-size analysis. See the *Stata Power, Precision, and Sample-Size Reference Manual*.

gsbounds and gsdesign calculate stopping boundaries and sample sizes for group sequential designs. See the *Stata Adaptive Designs: Group Sequential Trials Reference Manual*.