POWER, PRECISION, AND SAMPLE-SIZE ANALYSIS

New in Stata 16: Precision and sample size for CIs

- How many subjects are needed for a test to achieve the desired power or for a CI to achieve the desired width?
- Or what is the minimum effect size that can be detected for a given number of subjects and power?
- What about the minimum CI width?

Stata’s power and new ciwidth commands can answer these questions and more.

**Power and sample size for tests**

`power` provides power and sample-size analysis for hypothesis tests. Compute power, sample size, effect size, and more.

For instance, compute total sample size required to detect an experimental-group mean of 600 given a control-group mean of 520 with a common standard deviation of 135; assume a two-sided 5%-level test, a power of 80%, and equal-sized groups (the defaults),

```
. power twomeans 520 600, sd(135)
```

```
Estimated sample sizes for a two-sample means test t test assuming sd1 = sd2 = sd
Ho: m2 = m1  versus  Ha: m2 != m1
Study parameters:
  alpha =  0.0500
  power =  0.8000
  delta =  80.0000
  m1 =  520.0000
  m2 =  600.0000
  sd =  135.0000
Estimated sample sizes:
  N =        92
  N per group =        46
```

With both commands, you can specify single values or, to compare multiple scenarios, ranges of values of study parameters. You can obtain results either in tabular form or as a graph. You can also easily add your own methods.

**Precision and sample size for CIs**

`ciwidth` provides precision and sample-size analysis for confidence intervals (CIs). You can compute probability of CI width, sample size, and CI width. Enter any two and get the third.

Compute the total sample size required for a two-sided 95% CI (the default) for the difference between two means with a common standard deviation of 6 to have a width no larger than 5 with a probability of 90%,

```
. ciwidth twomeans, width(5) probwidth(.9) sd(6)
```

```
Performing iteration ... 
Estimated sample sizes for a two-means-difference CI
Student’s t two-sided CI assuming σ1 = σ2 = σ
Study parameters:
  level =    95.00
  Pr width =    0.9000
  width =    5.0000
  sd =    6.0000
Estimated sample sizes:
  N =       108
  N per group =        54
```

Parameters: 100(1-α) = 95, pwidth = .9

New

- Hypothesis tests
  - Classic comparisons of means, proportions, and more
  - ANOVA models
  - Linear regression
  - Contingency tables
  - Survival analysis
  - Cluster randomized designs (CRDs)
- Confidence intervals
  - One mean
  - One variance
  - Two independent means
  - Two paired means
- Add your own methods
- Automatic and customizable tables and graphs
Add your own methods

Sometimes, you may need to compute power or sample size yourself, for instance, by simulation. `power` makes it easy for you to add your own method. All you need to do is write a program that computes sample size, power, or effect size, and `power` will do the rest for you.

```
program power_cmd_myztest, rclass
version 16.0
// parse options
syntax , n(integer) /// sample size
STDDiff(real)  /// standardized diff.
Alpha(string)  /// significance level
// compute power
tempname power
scalar `power' = normal(`stddiff'*sqrt(`n') -
invnormal(1-`alpha'/2))
// return results
return scalar power   = `power'
return scalar N       = `n'
return scalar alpha   = `alpha'
return scalar stddiff = `stddiff'
end
```

Similarly, you can add your own methods to `ciwidth`.

Perform analyses using point and click

You can perform your analyses interactively by typing the commands or by using a point-and-click GUI available via the PSS Control Panel.

```
. power myztest, n(10(1)20) alpha(.05 .10 .25) stddiff(1) graph
```

```
stata.com/new-in-stata/sample-size-for-confidence-intervals
stata.com/features/power-and-sample-size/
```