FEATURES

POWER, PRECISION, AND SAMPLE-SIZE ANALYSIS

New in Stata 16: Precision and sample size for CIs

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

- 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

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

<table>
<thead>
<tr>
<th>Study parameters:</th>
<th>N = 92</th>
</tr>
</thead>
<tbody>
<tr>
<td>alpha</td>
<td>0.0500</td>
</tr>
<tr>
<td>power</td>
<td>0.8000</td>
</tr>
<tr>
<td>delta</td>
<td>80.0000</td>
</tr>
<tr>
<td>m1</td>
<td>520.0000</td>
</tr>
<tr>
<td>m2</td>
<td>600.0000</td>
</tr>
<tr>
<td>sd</td>
<td>135.0000</td>
</tr>
</tbody>
</table>

Estimated sample sizes:

N = 92

N per group = 46

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%,

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

Estimated sample sizes for a two-means-difference CI

<table>
<thead>
<tr>
<th>Study parameters:</th>
<th>Estimated sample sizes:</th>
</tr>
</thead>
<tbody>
<tr>
<td>level</td>
<td>N = 108</td>
</tr>
<tr>
<td>Pr width</td>
<td>N per group = 54</td>
</tr>
<tr>
<td>width</td>
<td>95.00</td>
</tr>
<tr>
<td>sd</td>
<td>6.0000</td>
</tr>
</tbody>
</table>

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.
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.

```stata
program power_cmd_myzttest, rclass
version 16.0
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 twomeans 520 (540 560 580 600), k1(10) m1(5) m2(10)
    sd(135) rho(0.1(0.1)0.7) graph(xdim(rho))
```

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