Syntax

\texttt{ameans [varlist] [if] [in] [weight] [ , options]}

\textit{options} \hspace{1cm} \textit{Description}

<table>
<thead>
<tr>
<th>Main</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>\texttt{add(#)}</td>
<td>add # to each variable in \texttt{varlist}</td>
</tr>
<tr>
<td>\texttt{only}</td>
<td>add # only to variables with nonpositive values</td>
</tr>
<tr>
<td>\texttt{level(#)}</td>
<td>set confidence level; default is \texttt{level(95)}</td>
</tr>
</tbody>
</table>

\textit{by} is allowed; see \texttt{[D] by}.
\textit{aweights} and \textit{fweights} are allowed; see \texttt{[U] 11.1.6 weight}.

Menu

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Description

\texttt{ameans} computes the arithmetic, geometric, and harmonic means, with their corresponding confidence intervals, for each variable in \texttt{varlist} or for all the variables in the data if \texttt{varlist} is not specified. \texttt{gmeans} and \texttt{hmeans} are synonyms for \texttt{ameans}.

If you simply want arithmetic means and corresponding confidence intervals, see \texttt{[R] ci}.

Options

\texttt{add(#)} adds the value \# to each variable in \texttt{varlist} before computing the means and confidence intervals. This option is useful when analyzing variables with nonpositive values.

\texttt{only} modifies the action of the \texttt{add(#)} option so that it adds \# only to variables with at least one nonpositive value.

\texttt{level(#)} specifies the confidence level, as a percentage, for confidence intervals. The default is \texttt{level(95)} or as set by \texttt{set level}; see \texttt{[U] 20.7 Specifying the width of confidence intervals}. 
Remarks and examples

Example 1

We have a dataset containing 8 observations on a variable named \( x \). The eight values are 5, 4, \(-4\), \(-5\), 0, 0, `missing`, and 7.

\[
\begin{array}{|c|c|c|c|}
\hline
\text{Variable} & \text{Type} & \text{Obs} & \text{Mean} \quad [95\% \text{ Conf. Interval}] \\
\hline
x & \text{Arithmetic} & 7 & 1 \quad -3.204405 \quad 5.204405 \\
 & \text{Geometric} & 3 & 5.192494 \quad 2.57899 \quad 10.45448 \\
 & \text{Harmonic} & 3 & 5.060241 \quad 3.023008 \quad 15.5179 \\
\hline
\end{array}
\]

\[
\begin{array}{|c|c|c|c|}
\hline
\text{Variable} & \text{Type} & \text{Obs} & \text{Mean} \quad [95\% \text{ Conf. Interval}] \\
\hline
x & \text{Arithmetic} & 7 & 6 \quad 1.795595 \quad 10.2044 * \\
 & \text{Geometric} & 6 & 5.477226 \quad 2.1096 \quad 14.22071 * \\
 & \text{Harmonic} & 6 & 3.540984 \quad . \quad . * \\
\hline
\end{array}
\]

(*) 5 was added to the variables prior to calculating the results. Missing values in confidence intervals for harmonic mean indicate that confidence interval is undefined for corresponding variables. Consult Reference Manual for details.

The number of observations displayed for the arithmetic mean is the number of nonmissing observations. The number of observations displayed for the geometric and harmonic means is the number of nonmissing, positive observations. Specifying the `add(5)` option produces 3 more positive observations. The confidence interval for the harmonic mean is not reported; see Methods and formulas below.

Video example

Descriptive statistics in Stata

Stored results

`ameans` stores the following in `r()`:

Scalars:
- `r(N)` number of nonmissing observations; used for arithmetic mean
- `r(N_pos)` number of nonmissing positive observations; used for geometric and harmonic means
- `r(mean)` arithmetic mean
- `r(lb)` lower bound of confidence interval for arithmetic mean
- `r(ub)` upper bound of confidence interval for arithmetic mean
- `r(Var)` variance of untransformed data
- `r(mean_g)` geometric mean
- `r(lb_g)` lower bound of confidence interval for geometric mean
- `r(ub_g)` upper bound of confidence interval for geometric mean
- `r(Var_g)` variance of \( \ln x \)
- `r(mean_h)` harmonic mean
- `r(lb_h)` lower bound of confidence interval for harmonic mean
- `r(ub_h)` upper bound of confidence interval for harmonic mean
- `r(Var_h)` variance of \( 1/x \)
Methods and formulas


When restricted to the same set of values (that is, to positive values), the arithmetic mean ($\bar{x}$) is greater than or equal to the geometric mean, which in turn is greater than or equal to the harmonic mean. Equality holds only if all values within a sample are equal to a positive constant.

The arithmetic mean and its confidence interval are identical to those provided by `ci`; see [R] ci.

To compute the geometric mean, `ameans` first creates $u_j = \ln x_j$ for all positive $x_j$. The arithmetic mean of the $u_j$ and its confidence interval are then computed as in `ci`. Let $\bar{u}$ be the resulting mean, and let $[L, U]$ be the corresponding confidence interval. The geometric mean is then $\exp(\bar{u})$, and its confidence interval is $[\exp(L), \exp(U)]$.

The same procedure is followed for the harmonic mean, except that then $u_j = 1/x_j$. The harmonic mean is then $1/\bar{u}$, and its confidence interval is $[1/U, 1/L]$ if $L$ is greater than zero. If $L$ is not greater than zero, this confidence interval is not defined, and missing values are reported.

When weights are specified, `ameans` applies the weights to the transformed values, $u_j = \ln x_j$ and $u_j = 1/x_j$, respectively, when computing the geometric and harmonic means. For details on how the weights are used to compute the mean and variance of the $u_j$, see [R] summarize. Without weights, the formula for the geometric mean reduces to

$$\exp\left\{\frac{1}{n} \sum_j \ln(x_j)\right\}$$

Without weights, the formula for the harmonic mean is

$$\frac{n}{\sum_j \frac{1}{x_j}}$$

Acknowledgments

This improved version of `ameans` is based on the `gmc1` command (Carlin, Vidmar, and Ramalheira 1998) and was written by John Carlin of the Murdoch Children’s Research Institute and the University of Melbourne; Suzanna Vidmar of the University of Melbourne; and Carlos Ramalheira of Coimbra University Hospital, Portugal.

References


Also see

[R] ci — Confidence intervals for means, proportions, and counts
[R] mean — Estimate means
[R] summarize — Summary statistics
[SVY] svy estimation — Estimation commands for survey data