Package ‘bidask’

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Type Package

Title Efficient Estimation of Bid-Ask Spreads from Open, High, Low, and Close Prices

Version 2.0.2

Description

License GPL-3

URL https://github.com/eguidotti/bidask

BugReports https://github.com/eguidotti/bidask/issues

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Config/testthat/edition 3

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Author Emanuele Guidotti [aut, cre] (<https://orcid.org/0000-0002-8961-6623>), David Ardia [ctb] (<https://orcid.org/0000-0003-2823-782X>), Tim Kroencke [ctb] (<https://orcid.org/0000-0001-8700-356X>)

Maintainer Emanuele Guidotti <emanuele.guidotti@usi.ch>

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Description

Implements an efficient estimator of bid-ask spreads from open, high, low, and close prices as described in Ardia, Guidotti, & Kroencke (2021).

Usage

edge(open, high, low, close, sign = FALSE)

Arguments

open  numeric vector of open prices.
high  numeric vector of high prices.
low   numeric vector of low prices.
close numeric vector of close prices.
sign  whether signed estimates should be returned.

Details

Prices must be sorted in ascending order of the timestamp.

Value

The spread estimate. A value of 0.01 corresponds to a spread of 1%.

Note

Please cite Ardia, Guidotti, & Kroencke (2021) when using this package in publication.

References

Examples

# simulate open, high, low, and close prices with spread 1%
x <- sim(spread = 0.01)

# estimate the spread
edge(x$Open, x$High, x$Low, x$Close)

Description

This function performs simulations consisting of n periods (e.g., days) and where each period consists of a given number of trades. For each trade, the actual price $P_t$ is simulated as $P_t = P_{t-1}e^{\sigma x}$, where $\sigma$ is the standard deviation per trade and $x$ is a random draw from a unit normal distribution. The standard deviation per trade equals the volatility divided by the square root of the number of trades. Trades are assumed to be observed with a given probability. The bid (ask) for each trade is defined as $P_t$ multiplied by one minus (plus) half the spread and we assume a 50% chance that a bid (ask) is observed. High and low prices equal the highest and lowest prices observed during the period. Open and Close prices equal the first and the last price observed in the period. If no trade is observed for a period, then the previous Close is used as the Open, High, Low, and Close prices for that period.

Usage

```r
sim(
  n = 10000,
  trades = 390,
  prob = 1,
  spread = 0.01,
  volatility = 0.03,
  overnight = 0,
  drift = 0,
  units = "day",
  sign = FALSE
)
```

Arguments

- `n`: the number of periods to simulate.
- `trades`: the number of trades per period.
- `prob`: the probability to observe a trade.
- `spread`: the bid-ask spread.
- `volatility`: the open-to-close volatility.
- `overnight`: the close-to-open volatility.
drift  the expected return per period.
units  the units of the time period. One of: sec, min, hour, day, week, month, year.
sign  whether to return positive prices for buys and negative prices for sells.

Value

Simulated open, high, low, and close prices.

Note

Please cite Ardia, Guidotti, & Kroencke (2021) when using this package in publication.

References


Description

This function implements several methods to estimate bid-ask spreads from open, high, low, and close prices.

Usage

spread(x, width = nrow(x), method = "EDGE", sign = FALSE, na.rm = FALSE)

Arguments

x  xts object with columns named Open, High, Low, Close.
width  integer width of the rolling window to use, or vector of endpoints defining the intervals to use. By default, the whole time series is used to compute a single spread estimate.
method  the estimator(s) to use. See details.
sign  whether signed estimates should be returned.
aa.rm  whether missing values should be ignored.
spread

Details

The method EDGE implements the Efficient Discrete Generalized Estimator described in Ardia, Guidotti, & Kroencke (2021).

The methods OHL, OHLC, CHL, CHLO implement the generalized estimators described in Ardia, Guidotti, & Kroencke (2021). They can be combined by concatenating their identifiers, e.g., OHLC.CHLO uses an average of the OHLC and CHLO estimators.

The method AR implements the estimator described in Abdi & Ranaldo (2017). AR2 implements their 2-period version.

The method CS implements the estimator described in Corwin & Schultz (2012). CS2 implements their 2-period version. Both versions are adjusted for overnight (close-to-open) returns as described in the paper.

The method ROLL implements the estimator described in Roll (1984).

Value

Time series of spread estimates. A value of 0.01 corresponds to a spread of 1%.

Note

Please cite Ardia, Guidotti, & Kroencke (2021) when using this package in publication.

References


Examples

```r
# simulate open, high, low, and close prices with spread 1%
x <- sim(spread = 0.01)

# estimate the spread
spread(x)

# by default this is equivalent to
edge(x$Open, x$High, x$Low, x$Close)

# estimate the spread using a rolling window of 21 periods
spread(x, width = 21)

# estimate the spread for each month
```
ep <- xts::endpoints(x, on = "months")
spread(x, width = ep)

# use multiple estimators
spread(x, method = c("EDGE", "AR", "CS", "ROLL", "OHLC", "OHL.CHL"))
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