Package 'implied'

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Type Package

Title Convert Bookmaker Odds to Probabilities

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Description Convert bookmaker odds into proper probabilities. Seven different algorithms are available, including basic normalization, Shin's method (Hyun Song Shin, (1992) <doi:10.2307/2234526>), and others.

License GPL-3

Encoding UTF-8

LazyData true

RoxygenNote 7.0.2

Suggests testthat (>= 2.0.1), knitr, rmarkdown

VignetteBuilder knitr

NeedsCompilation no

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implied_probabilities   *Implied probabilities from bookmaker odds.*

Description

This function calculate the implied probabilties from bookmaker odds in decimal format, while accounting for overround in the odds.

Usage

```
implied_probabilities(
  odds,
  method = "basic",
  normalize = TRUE,
  grossmargin = 0,
  shin_method = "js"
)
```

Arguments

odds	A matrix or numeric of bookmaker odds. The odds must be in the decimal format.
method	A string giving the method to use. Valid methods are 'basic', 'shin', 'bb', 'wpo', 'or', 'power' or 'additive'.
normalize	Logical. Some of the methods will give small rounding errors. If TRUE (default) a final normalization is applied to make absoultely sure the probabilities sum to 1.
grossmargin	Numeric. Must be 0 or greater. See the details.
shin_method	Character. Either 'js' (defeault) or 'uniroot'. See the details.

Details

The method 'basic' is the simplest method, and computes the implied probabilities by dividing the inverted odds by the sum of the inverted odds.

The methods 'wpo' (Weights Proportional to the Odds), 'or' (Odds Ratio) and 'power' are form the Wisdom of the Crowds document (the updated version) by Joseph Buchdahl. The method 'or' is origianlly by Cheung (2015), and the method 'power' is there referred to as the logarithmic method.

The method 'shin' uses the method by Shin (1992, 1993). This model assumes that there is a fraction of insider trading, and that the bookmakers tries to maximize their profits. In addition to providing implied probabilties, the method also gives an estimate of the proportion if inside trade, denoted z. Two algorithms are implemented for finding the probabilities and z. Which algorithm to use is chosen via the shin_mehod argument. The default method (shin_method = 'js') is based on the algorithm in Jullien & Salanié (1994). The 'uniroot' method uses R's built in equation solver to find the probabilities. The uniroot approach is also used for the 'pwr' and 'or' methods. The

two methods might give slightly different answers, especially when the bookamer margin (and z) is small.

The 'bb' (short for "balanced books") method is from Fingleton & Waldron (1999), and is a variant of Shin's method. It too assume a fraction of insiders, but instead of assuming that the bookmakers maximize their profits, they minimize their risk.

Both the 'shin' and 'bb' methods can be used together with the 'grossmargin' argument. This is also from the Fingleton & Waldron (1999) paper, and adds some further assumption to the calculations, related to opperating costs. grossmargin should be 0 (default) or greater, typical range is 0 to 0.05. For values other than 0, this might sometimes cause some probabilities to not be identifiable. A warning will be given if this happens.

Value

A named list. The first component is named 'probabilities' and contain a matrix of implied probabilities. The second is the bookmaker margins (aka the overround). The third depends on the method used to compute the probabilities:

- zvalues (method = 'shin' and method='bb'): The estimated amount of insider trade.
- specific_margins (method = 'wpo'): Matrix of the margins applied to each outcome.
- odds_ratios (method = 'or'): Numeric with the odds ratio that is used to convert true probabilities to bookamker probabilties.
- exponents (method = 'power'): The (inverse) exponents that is used to convert true probabilities to bookamker probabilties.

The fourth compnent 'problematic' is a logical vector called indicating if any probabilites has fallen outside the 0-1 range, or if there were some other problem computing the probabilities.

References

- Hyun Song Shin (1992) Prices of State Contingent Claims with Insider Traders, and the Favourite-Longshot Bias
- Hyun Song Shin (1993) Measuring the Incidence of Insider Trading in a Market for State-Contingent Claims
- Bruno Jullien & Bernard Salanié (1994) Measuring the incidence of insider trading: A comment on Shin.
- John Fingleton & Patrick Waldron (1999) Optimal Determination of Bookmakers' Betting Odds: Theory and Tests.
- Joseph Buchdahl - USING THE WISDOM OF THE CROWD TO FIND VALUE IN A FOOT-BALL MATCH BETTING MARKET (https://www.football-data.co.uk/wisdom_of_crowd_bets)
- Keith Cheung (2015) Fixed-odds betting and traditional odds (https://www.sportstradingnetwork.com/article/fixed-odds-betting-traditional-odds/)

Examples

```
# Two sets of odds for a three-outcome game.
my_odds <- rbind(c(4.20, 3.70, 1.95),
                 c(2.45, 3.70, 2.90))
```

```
# Convert to probabilities using Shin's method.
converted_odds <- implied_probabilities(my_odds, method='shin')

# Look at the probabilities
converted_odds$probabilities
```

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