Package 'FinAsym'

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Type Package

Title Classifies implicit trading activity from market quotes and
computes the probability of informed trading

Version 1.0

Date 2012-04-02

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Description This package accomplishes two tasks: a) it classifies
implicit trading activity from quotes in OTC markets using the
algorithm of Lee and Ready (1991); b) based on information for
trade initiation, the package computes the probability of
informed trading of Easley and O'Hara (1987).

License GPL-3

LazyLoad yes

Repository CRAN

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NeedsCompilation no

R topics documented:

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FinAsym-package	*Classifies implicit trading activity from market quotes and computes the probability of informed trading*

Description

This package uses market quotes to classify implicit buy and sell-initiated trades in OTC markets through the algorithm of Lee and Ready (1991). Based on information for trade initiation, the package computes the probability of informed trading of Easley and O'Hara (1987).

Details

Package:	FinAsym
Type:	Package
Version:	1.0
Date:	2012-04-02
License:	GPL-3
LazyLoad:	yes

The package consists of two R functions. The classification of implicit trade origination from quotes is produced by classify_quotes.R. This functions takes two inputs, namely a matrix with as many rows as the number of intraday quotes, and two columns. It also requires the user to specify which column numbers include the bid and ask prices. The likelihood function for the PIN model is coded in the function pin_likelihood.R. This takes as inputs the parameter values - in the order of epsilon, mu, alpha, delta - and the time series of daily data on number of no trades, buy- and sell-initiated trades.

Author(s)

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References

D. Easley and M. O'Hara. Price, Trade Size, and Information in Securities Markets. Journal of Financial Economics, 19(1), 69-90, 1987.

C. M. C. Lee and M. J. Ready. Inferring Trade Direction from Intraday Data. Journal of Finance, 46(2), 733-746, 1991.

Examples

```
#Sample data
mydata<-matrix(c(4.56, 4.7, 4.57, 4.64, 4.53,
4.65, 4.59, 4.66, 4.55, 4.65, 4.59, 4.66, 4.59,
4.66, 4.55, 4.65, 4.55, 4.65, 4.55, 4.65, 4.59,
4.66, 4.55, 4.65, 4.59, 4.66, 4.59, 4.66),
```

```
      nrow=14, byrow=TRUE)

      #Trading day
      gname <- 'June 29 2006'

      ind_bid <- c(1)
      ind_ask <- c(2)

      quotes_types <- classify_quotes(mydata, ind_bid,
      ind_ask, gname)

      #Again, sample data for 15 trading sessions
      qdata       <- matrix(0, 3 ,1)
      qdata[1]    <- 9
      qdata[2]    <- 6
      qdata[3]    <- 13
      classified <- matrix(qdata,3,15)

      #Make a starting guess at the solution
      par0 <- c(0.5, 0.5, 0.5, 0.5)

      param_optim <- optim(par0, pin_likelihood,
      gr=NULL, classified)

      alph <- c( param_optim$par[3] )
      miu  <- c( param_optim$par[2] )
      delt <- c( param_optim$par[4] )
      epsi <- c( param_optim$par[1] )

      PSI <- c( ( 1-miu )*epsi + miu )
      pin <- c( miu/PSI )

      msg_pin <- paste("The average PIN over the
      trading period is:", pin, sep=" ")

      print( msg_pin )
```

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classify_quotes   *Classification of implicit trade origination from market quotes*

Description

The information on trade origination (i.e.g buy- or sell-initiated) is available for a variety of markets and trading platforms. However, data on effective trades for over-the-counter - OTC - markets are hard to find and, when available, they may be unreliable. Instead, for OTC markets, quotes are typically easily accessible. This R function is used to classify implicit trading activity from market quotes. The classification method is standard in the literature on market microstructure and relies on Lee and Ready (1991).

Usage

```
classify_quotes(returns, ind_bid, ind_ask, trading_day)
```

Arguments

returns	Numerical matrix of intra-daily market quotes organised by continuous and consecutive time stamps either for a given trading day, or for round-the-clock trading activities. In the second case, no indication of the trading day is necessary. This matrix has a row dimension equal to the number of intra-daily quotes and a column dimension equal to 2 - one for the best bid prices and the other for the best ask prices available for each time stamp.
ind_bid	Column number for bid prices in the matrix 'returns'.
ind_ask	Column number for ask prices in the matrix 'returns'.
trading_day	String indicating the trading day to which the intra-daily quotes refer.

Details

The code considers five possible cases for trade classification. An increase in both ask and bid prices indicates that dealers are willing to sell the contract at a price higher than in the previous transaction. This reflects a buy order. A fall in both ask and bid prices, instead, suggest that a sell order takes place. An increase in the ask and a decrease in the bid is classified according to the relative size of the change. If the positive increase in the ask is larger (lower) than the decrease of the bid in absolute value, then the trade is classified as buy (sell) initiated. If the positive increase in the bid is larger (smaller) than the fall in the ask price, then the trade is classified as buy (sell) initiated. Finally, symmetric changes or no changes at all in bid and ask prices indicate no trading.

Two additional caveats apply. This implementation of the Lee-Ready algorithm admits no missing values for intra-daily quotes. Therefore the user should clean up the dataset and remove any missing values. Moreover, the quotes should follow a chronological order.

Value

no_trades	Number of implicit trades with no sign classification.
sell_trades	Number of sell-initiated trades.
buy_trades	Number of buy-initiated trades.

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References

C. M. C. Lee and M. J. Ready. Inferring Trade Direction from Intraday Data. Journal of Finance, 46(2), 733-746, 1991.

Examples

```
#Sample data
mydata<-matrix(c(4.56, 4.7, 4.57, 4.64, 4.53,
4.65, 4.59, 4.66, 4.55, 4.65, 4.59, 4.66, 4.59,
4.66, 4.55, 4.65, 4.55, 4.65, 4.55, 4.65, 4.59,
4.66, 4.55, 4.65, 4.59, 4.66, 4.59, 4.66),
nrow=14, byrow=TRUE)

#Trading day
gname <- 'June 29 2006'

ind_bid <- c(1)
ind_ask <- c(2)

quotes_types <- classify_quotes(mydata, ind_bid,
ind_ask, gname)
```

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pin_likelihood	*Log-likelihood function for the estimation of the structural model of Easley and O'Hara (1987).*

Description

This function computes the value of the log-likelihood function (negative of) for the model of strategic trading with asymmetric information proposed by Easley and O'Hara (1987). This is an application of the sequential trade model of Kyle (1985).

Usage

```
pin_likelihood(params, n_trades)
```

Arguments

params	Parameters of the structural model in the following order: epsilon, mu, alpha, delta.
n_trades	A data matrix with 3 rows and a number of columns equal to the trading days. The first row includes the number of implicit trades without identified sign, the so-called 'no trades'. Buy-initiated trades are stored along the second row. Sell-initiated trades are indexed by the third row.

Details

The application of the model of Easley and O'Hara is based on the assumption that an equal share of uninformed traders buys or sells the asset, i.e. lambda=1/2. I also assume that the trader cannot make a distinction between uninformed counterparts who are willing to trade and those who are not, i.e. epsilon_s=epsilon_b=1/2.

Value

likel_final   Value of the likelihood function.

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References

D. Easley and M. O'Hara. Price, Trade Size, and Information in Securities Markets. Journal of Financial Economics, 19(1), 69-90, 1987.

L. R. Glosten and L. E. Harris. Estimating the Components of the Bid/Ask Spread. Journal of Financial Economics, 21(1), 123-142, 1988.

A. S. Kyle. Continuous Auctions and Insider Trading. Econometrica, 53(6):1315-1335, 1985.

Examples

```
#Sample data
mydata<-matrix(c(11, 17, 14, 12, 11, 14,
17, 14, 16, 8, 9, 13, 13, 13, 15, 7, 11,
13, 14, 19, 14, 7, 11, 6, 12, 6, 17, 10,
5, 7), nrow=3, byrow=TRUE)

#Make a starting guess at the solution
par0 <- c(0.5, 0.5, 0.5, 0.5)

param_optim <- optim(par0, pin_likelihood,
gr=NULL, mydata)
```

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