

Package ‘RTL’

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Type Package

Title Risk Tool Library - Trading, Risk, 'Analytics' for Commodities

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Description A toolkit for Commodities 'analytics', risk management and trading professionals. Includes functions for API calls to <https://commodities.morningstar.com/#/>, <https://developer.genscape.com/>, and <https://www.bankofcanada.ca/valet/docs>.

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URL <https://github.com/risktoollib/RTL>

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bond	<i>Bond pricing</i>
------	---------------------

Description

Compute bond price, cash flow table or duration

Usage

```
bond(ytm = 0.05, C = 0.05, T2M = 1, m = 2, output = "price")
```

Arguments

ytm	Yield to Maturity. numeric
C	Coupon rate per annum. numeric
T2M	Time to maturity in years. numeric
m	Periods per year for coupon payments e.g semi-annual = 2. numeric
output	"price", "df" or "duration". character

Value

Returns price numeric, cash flows tibble, or duration numeric

Author(s)

Philippe Cote

Examples

```
bond(ytm = 0.05, C = 0.05, T2M = 1, m = 2, output = "price")
bond(ytm = 0.05, C = 0.05, T2M = 1, m = 2, output = "df")
bond(ytm = 0.05, C = 0.05, T2M = 1, m = 2, output = "duration")
```

chart_eia_sd

EIA weekly supply-demand information by product group

Description

Given a product group extracts all information to create SD Balances.

Usage

```
chart_eia_sd(
  market = "mogas",
  key = "your EIA.gov API key",
  from = "2011-01-01",
  legend.pos = list(x = 0.4, y = 0.53),
  output = "chart"
)
```

Arguments

market	"mogas", "dist", "jet" or "resid". character
key	Your private EIA API token. character
from	Date as character "2020-07-01". Default to all dates available. character
legend.pos	Defaults to list(x = 0.4, y = 0.53). list
output	"chart" for plotly object or "data" for dataframe.

Value

A plotly chart htmlwidget or a tibble.

Author(s)

Philippe Cote

Examples

```
## Not run:
chart_eia_sd(key = key, market = "mogas")

## End(Not run)
```

chart_eia_steo	<i>EIA Short Term Energy Outlook</i>
----------------	--------------------------------------

Description

Extract data and either plots or renders dataframe.

Usage

```
chart_eia_steo(  
  market = "globalOil",  
  key = "your EIA.gov API key",  
  from = "2018-07-01",  
  fig.title = "EIA STEO Global Liquids SD Balance",  
  fig.units = "million barrels per day",  
  legend.pos = list(x = 0.4, y = 0.53),  
  output = "chart"  
)
```

Arguments

market	"globalOil" only currently implemented. character
key	Your private EIA API token. character
from	Date as character "2020-07-01". Default to all dates available. character
fig.title	Defaults to "EIA STEO Global Liquids SD Balance". character
fig.units	Defaults to "million barrels per day" character
legend.pos	Defaults to list(x = 0.4, y = 0.53) list
output	"chart" for plotly object or "data" for dataframe.

Value

A plotly chart htmlwidget or a tibble.

Author(s)

Philippe Cote

Examples

```
## Not run:  
chart_eia_steo(key = EIAkey, market = "globalOil")  
  
## End(Not run)
```

chart_fwd_curves	<i>Plots historical forward curves</i>
------------------	--

Description

Returns a plot of forward curves through time

Usage

```
chart_fwd_curves(df = dfwide, cmdty = "cmewti", weekly = TRUE, ...)
```

Arguments

df	Wide dataframe with date column and multiple series columns (multivariate). tibble
cmdty	Futures contract code in expiry_table object: unique(expiry_table\$cmdty). character
weekly	Defaults to TRUE for weekly forward curves. logical
...	other graphical parameters

Value

plot of forward curves through time. NULL

Author(s)

Philippe Cote

Examples

```
df <- dfwide %>%
  dplyr::select(date, dplyr::starts_with("CL")) %>%
  tidyr::drop_na()
chart_fwd_curves(
  df = df, cmdty = "cmewti", weekly = TRUE,
  main = "WTI Forward Curves", ylab = "$ per bbl", xlab = "", cex = 2
)
```

chart_pairs	<i>Pairwise scatter plots for timeseries</i>
-------------	--

Description

Plots pairwise scatter plots with the time dimension. Useful when exploring structural changes in timeseries properties for modeling.

Usage

```
chart_pairs(df = df, title = "Time Series Pairs Plot")
```

Arguments

df	Wide data frame. tibble
title	Chart title. character

Value

A plotly object. htmlwidget

Author(s)

Philippe Cote

Examples

```
df <- dfwide %>%
  dplyr::select(date, CL01, NG01, H001, RB01) %>%
  tidyr::drop_na()
chart_pairs(df = df, title = "example")
```

chart_PerfSummary	<i>Cumulative performance and drawdown summary.</i>
-------------------	---

Description

Multi Asset Display of Cumulative Performance and Drawdowns

Usage

```
chart_PerfSummary(
  ret = ret,
  geometric = TRUE,
  main = "Cumulative Returns and Drawdowns",
  linesize = 1.25
)
```

Arguments

ret	Wide dataframe univariate or multivariate of percentage returns. tibble
geometric	Use geometric returns TRUE or FALSE. logical
main	Chart title. character
linesize	Size of lines in chart and legend. numeric

Value

Cumulative performance and drawdown charts. ggplot

Author(s)

Philippe Cote

Examples

```
ret <- data.frame(
  date = seq.Date(Sys.Date() - 60, Sys.Date(), 1),
  CL01 = rnorm(61, 0, .01), RB01 = rnorm(61, 0, 0.02)
)
chart_PerfSummary(ret = ret,
  geometric = TRUE,
  main = "Cumulative Returns and Drawdowns",
  linesize = 1.25)
```

chart_spreads

Futures contract spreads comparison across years

Description

Plots specific contract pairs across years with time being days from expiry.

Usage

```
chart_spreads(
  cpairs = cpairs,
  daysFromExpiry = 200,
  from = "2012-01-01",
  conversion = c(1, 1),
  feed = "CME_NymexFutures_EOD",
  iuser = "x@xyz.com",
  ipassword = "pass",
  title = "March/April ULSD Nymex Spreads",
  yaxis = "$ per bbl",
  output = "chart"
)
```


Arguments

cpairs	Tibble of contract pairs - see example for expiry when not expired yet. tibble
daysFromExpiry	Number of days from expiry to compute spreads. numeric
from	From date character
conversion	Defaults to c(1,1) first and second contracts. 42 from \$ per gallons to bbls. numeric
feed	Morningstar Feed Table. character
iuser	Morningstar user name as character - sourced locally in examples. character
ipassword	Morningstar user password as character - sourced locally in examples. character
title	Title for chart. character
yaxis	y-axis label. character
output	"chart" for htmlwidget or "data" for tibble.

Value

A plotly object or a dataframe

Author(s)

Philippe Cote

Examples

```
## Not run:
cpairs <- dplyr::tibble(
  year = c("2018", "2019", "2020", "2021", "2022", "2023"),
  first = c("@H08H", "@H09H", "@H00H", "@H021H", "@H022H", "@H023H"),
  second = c("@CL8H", "@CL9H", "@CL0H", "@CL21H", "@CL22H", "@CL23H"),
  expiry = c(NA, NA, NA, NA, NA, "2023-02-23")
)
chart_spreads(
  cpairs = cpairs, daysFromExpiry = 200, from = "2012-01-01",
  conversion = c(42, 1), feed = "CME_NymexFutures_EOD",
  iuser = "x@xyz.com", ipassword = "pass",
  title = "March/April ULSD Nymex Spreads",
  yaxis = "$ per bbl",
  output = "data"
)

## End(Not run)
```

chart_zscore	<i>Z-Score applied to seasonal data divergence</i>
--------------	--

Description

Supports analytics and display of seasonal data. Z-Score is computed on residuals conditional on their seasonal period. Beware that most seasonal charts in industry e.g. (NG Storage) is not de-trended so results once you apply an STL decomposition will vary from the unadjusted seasonal plot.

Usage

```
chart_zscore(
  df = df,
  title = "NG Storage Z Score",
  per = "yearweek",
  output = "zscore",
  chart = "seasons"
)
```

Arguments

df	Long data frame with columns series, date and value. tibble
title	Default is a blank space returning the unique value in df\$series. character
per	Frequency of seasonality "yearweek" (DEFAULT). "yearmonth", "yearquarter" character
output	"stl" for STL decomposition chart, "stats" for STL fitted statistics. "res" for STL fitted data. "zscore" for residuals Z-score, "seasonal" for standard seasonal chart.
chart	"seasons" for feasts::gg_season() (DEFAULT) "series" for feasts::gg_subseries()

Value

Time series of STL decomposition residuals Z-Scores, or standard seasonal chart with feasts package.

Author(s)

Philippe Cote

Examples

```
## Not run:
df <- eiaStocks %>% dplyr::filter(series == "NGLower48")
title <- "NGLower48"
chart_zscore(df = df, title = " ", per = "yearweek", output = "stl", chart = "seasons")
chart_zscore(df = df, title = " ", per = "yearweek", output = "stats", chart = "seasons")
```

```

chart_zscore(df = df, title = " ", per = "yearweek", output = "res", chart = "seasons")
chart_zscore(df = df, title = " ", per = "yearweek", output = "zscore", chart = "seasons")
chart_zscore(df = df, title = " ", per = "yearweek", output = "seasonal", chart = "seasons")

## End(Not run)

```

cma

metadata for WTI CMA

Description

CME WTI Calendar Month Average swap information

Usage

```
cma
```

Format

data frame

Value

tibble

Source

cme

CRReuro

Cox-Ross-Rubinstein binomial option model

Description

European option binomial model on a stock without dividends. For academic purpose only. Use `fOptions::CRRBinomialTreeOptions` for real-life usage.

Usage

```
CRReuro(S, X, sigma, r, T2M, N, type)
```

Arguments

S	Stock price. numeric
X	Strike price. numeric
sigma	Implied volatility e.g. 0.20 numeric
r	Risk-free rate. numeric
T2M	Time to maturity in years numeric
N	Number of time steps. Internally $dt = T2M/N$. numeric
type	"call" or "put" character

Value

List of asset price tree, option value tree and option price. list

Author(s)

Philippe Cote

Examples

```
CRReuro(S = 100, X = 100, sigma = 0.2, r = 0.1, T2M = 1, N = 5, type = "call")
```

crudeOil	<i>dataset: crude assays</i>
----------	------------------------------

Description

crude assays

Usage

```
crudeOil
```

Format

list

Value

list

cushing	<i>dataset: WTI Cushing Futures and storage utilization</i>
---------	---

Description

c1, c2, c1c2 and Cushing storage utilization

Usage

cushing

Format

list

Value

list

Source

CME and EIA

dflong	<i>dataset: commodity prices in a long dataframe format</i>
--------	---

Description

Futures settlement data set.

Usage

dflong

Format

data frame

Value

tibble

Source

Morningstar Commodities

dfwide	<i>dataset: commodity prices in a wide dataframe format</i>
--------	---

Description

Futures settlement data set.

Usage

```
dfwide
```

Format

data frame

Value

tibble

Source

Morningstar Commodities

efficientFrontier	<i>Markowitz Efficient Frontier</i>
-------------------	-------------------------------------

Description

Generates random portfolio weights statistics based on absolute returns.

Usage

```
efficientFrontier(
  nsims = 5000,
  x = RTL::fizdiffs %>% dplyr::select(date, dplyr::contains("WCS")),
  expectedReturns = NULL
)
```

Arguments

nsims	Number of portfolio simulations. Defaults to 5000 numeric
x	List as provided by output of RTL::simMultivariates(). list
expectedReturns	Defaults to NULL using periodic returns means. numeric

Details**Commodities:**

Unlike traditional portfolio management, in commodities many transactions are with derivatives (futures and swaps) and have zero or low initial investments.

Return types:

This function is used for commodities where returns are dollars per units for real assets e.g. storage tanks, pipelines...Here we measure directly the periodic return in dollars per contract unit.

Empirical Finance:

I would encourage you to pick a commodity futures contract of your choice and draw a scatter plot of price level versus the daily dollar per unit change as measure of risk. As a trading analyst or risk manager, then ask yourself about the implications of using log returns that you then re-apply to current forward curve level to arrive at a dollar risk measure per units instead of measuring directly risk in dollars per unit.

Value

List of portfolios and chart of efficient frontier list

Author(s)

Philippe Cote

Examples

```
x = RTL::fizdiffs %>% dplyr::select(date, dplyr::contains("WCS"))
efficientFrontier(nsims = 10, x = x, expectedReturns = NULL)
efficientFrontier(nsims = 10, x = x, expectedReturns = c(0.5,0.8,0.9))
```

eia2tidy

EIA API call with tidy output

Description

Extracts data from the Energy Information Administration (EIA) API to tibble format with optional custom series name. Makes a clean wrapper for use with purrr for multiple series extraction. Query Browser at <https://www.eia.gov/opendata/qb.php>.

Usage

```
eia2tidy(ticker, key, name = " ")
```

Arguments

ticker	EIA series name. character
key	Your private EIA API token as character "yourapikey". character
name	Name you want to give the series. Defaults to ticker if set to " " character

Value

A tibble object with class date for weekly, monthly, quarterly or annual data and class POSIXct for hourly. tibble

Author(s)

Philippe Cote

Examples

```
## Not run:
# Single Series
RTL::eia2tidy(ticker = "PET.MCRFPTX2.M", key = "yourapikey", name = "TexasProd")
# Multiple Series
# Use eia2tidy_all() or pivot_longer, drop_na and then pivot_wider to wrangled results.

## End(Not run)
```

eia2tidy_all

EIA API multiple calls with tidy output

Description

Extracts data from the Energy Information Administration (EIA) API to tibble format with optional custom series name. Makes a clean wrapper for use with purrr for multiple series extraction. Query Browser at <https://www.eia.gov/opendata/qb.php>.

Usage

```
eia2tidy_all(
  tickers = tibble::tribble(~ticker, ~name, "PET.W_EPC0_SAX_YCUOK_MBBL.W",
    "CrudeCushing", "NG.NW2_EPG0_SWO_R48_BCF.W", "NGLower48"),
  key,
  long = TRUE
)
```

Arguments

tickers	tibble of EIA series and names you want to assign. character
key	Your private EIA API token as character "yourapikey". character
long	TRUE (default) to return a long data frame or FASLE for wide. logical

Value

A tibble object with class date for weekly, monthly, quarterly or annual data and class POSIXct for hourly. tibble

Author(s)

Philippe Cote

Examples

```
## Not run:
eia2tidy_all(tickers = tibble::tribble(~ticker, ~name,
                                     "PET.W_EPC0_SAX_YCUOK_MBBL.W", "CrudeCushing",
                                     "NG.NW2_EPG0_SWO_R48_BCF.W", "NGLower48"),
            key = "your API key", long = TRUE)

## End(Not run)
```

eiaStocks	<i>dataset: EIA weekly stocks</i>
-----------	-----------------------------------

Description

EIA weekly crude, NG, ULSD and RBOB stocks.

Usage

eiaStocks

Format

data frame

Value

tibble

eiaStorageCap	<i>dataset: EIA working storage capacity</i>
---------------	--

Description

EIA working storage capacity in kbs except NG in bcf.

Usage

eiaStorageCap

Format

data frame

Value

tibble

`eurodollar`*dataset: Eurodollar futures contracts*

Description

ED futures contract for December 2024

Usage`eurodollar`**Format**

data frame

Value

tibble

Source

Morningstar

`expiry_table`*dataset: expiry of common commodity futures contract.*

Description

This dataframe provides detailed information on major futures contracts specifications pertaining to last settlement, notices and delivery dates. It also provides tickers in some data service.

Usage`expiry_table`**Format**

data frame

Value

tibble

fitOU	<i>Fits a Ornstein–Uhlenbeck process to a dataset</i>
-------	---

Description

Parameter estimation for Ornstein–Uhlenbeck process

Usage

```
fitOU(spread)
```

Arguments

spread Spread time series. tibble

Value

List of alpha, mu and sigma estimates. list

Author(s)

Philippe Cote

Examples

```
spread <- simOU(mu = 5, theta = .5, sigma = 0.2, T = 5, dt = 1 / 250)
fitOU(spread)
```

fizdiffs	<i>dataset: randomised physical crude differentials</i>
----------	---

Description

Randomized data set for education purpose of selected physical crude differentials to WTI.

Usage

```
fizdiffs
```

Format

data frame

Value

tibble

futuresRef	<i>dataset: futures contracts metadata</i>
------------	--

Description

Exchange-traded contract month codes and specifications.

Usage

futuresRef

Format

data frame

Value

tibble

fxfwd	<i>dataset: USDCAD FX forward rates</i>
-------	---

Description

USDCAD historicals and forward curve

Usage

fxfwd

Format

list

Value

list

Source

Morningstar and <https://ca.investing.com/rates-bonds/forward-rates>

garch	<i>Wrapper for a Garch(1,1) returning either a plot or data.</i>
-------	--

Description

Computes annualised Garch(1,1) volatilities using fGarch package.

Usage

```
garch(x = x, out = TRUE)
```

Arguments

x	Wide dataframe with date column and single series (univariate). tibble
out	"chart" to return replot_xts chart, "data" to return xts data or "fit" for uGARCHfit fit output

Value

replot_xts chart, xts data, or uGARCHfit fit

Author(s)

Philippe Cote

Examples

```
## Not run:
x <- dflong %>% dplyr::filter(series == "CL01")
x <- returns(df = x, retType = "rel", period.return = 1, spread = TRUE)
x <- rolladjust(x = x, commodityname = c("cmewti"), rolltype = c("Last.Trade"))
summary(garch(x = x, out = "fit"))
garch(x = x, out = "chart")
garch(x = x, out = "data")

## End(Not run)
```

getBoC	<i>Bank of Canada Valet API</i>
--------	---------------------------------

Description

Extracts series from the Bank of Canada's Valet API. API documentation at <https://www.bankofcanada.ca/valet/docs>.

Usage

```
getBoC(series)
```

Arguments

series Array of series name: c("FXCADUSD", "BD.CDN.2YR.DQ.YLD"). character

Value

A long data frame. tibble

Author(s)

Philippe Cote

Examples

```
RTL::getBoC(series = c("FXCADUSD", "BD.CDN.2YR.DQ.YLD"))
```

getCurve

Morningstar Commodities API forward curves

Description

Returns forward curves from Morningstar API. See below for current feeds supported. You need your own credentials with Morningstar.

Usage

```
getCurve(
  feed = "CME_NymexFutures_EOD_continuous",
  contract = "CL",
  numOfcontracts = 12,
  date = "2023-08-24",
  fields =
    c("open_price, high_price, low_price, settlement_price, volume, open_interest"),
  iuser = "x@xyz.com",
  ipassword = "pass"
)
```

Arguments

feed Morningstar Feed Table e.g "Crb_Futures_Price_Volume_And_Open_Interest". character

contract Morningstar contract root e.g. "CL" for CME WTI and "BG" for ICE Brent. character

numOfcontracts Number of listed contracts to retrieve. numeric

date Date yyyy-mm-dd. character

fields Defaults to c("open_price, high_price, low_price, settlement_price, volume, open_interest"). character

iuser Morningstar user name as character - sourced locally in examples. character

ipassword Morningstar user password as character - sourced locally in examples. character

Value

wide data frame. tibble

Current Feeds Supported

- CME_NymexFutures_EOD_continuous

Author(s)

Philippe Cote

Examples

```
## Not run:
# CME WTI Futures
getCurve(
  feed = "CME_NymexFutures_EOD_continuous", contract = "CL",
  date = "2023-08-24",
  fields = c("open_price, high_price, low_price, settlement_price, volume, open_interest"),
  iuser = "x@xyz.com", ipassword = "pass"
)

## End(Not run)
```

getGenscapePipeOil *Genscape API call for oil pipelines*

Description

Returns oil pipeline flows in barrels per day data from Genscape API. You need your own credentials. Refer to API documentation for argument values. It is assumed if you use this function that you know the pipelines you need to extract to build supply demand balances. Use the online API to identify the pipeline IDs. <https://developer.genscape.com/docs/services/oil-transportation/operations/GetPipelineFlowValues>

Usage

```
getGenscapePipeOil(
  frequency = "daily",
  regions = "Canada",
  pipelineIDs = c(97),
  revision = "revised",
  limit = 5000,
  offset = 0,
  startDate = "2015-01-01",
  endDate = as.character(Sys.Date()),
  apikey = "yourapikey"
)
```

Arguments

frequency	"daily" DEFAULT. character
regions	See API webpage. Multiple values separated by commas e.g. "Canada", "Gulf-Coast"). character
pipelineIDs	See API webpage. c(98,54...) for specific pipes. numeric
revision	See API webpage. character
limit	See API webpage. Max 5000. numeric
offset	See API webpage. numeric
startDate	"yyyy-mm-dd". character
endDate	"yyyy-mm-dd". character
apikey	Your API key. character

Value

wide data frame. tibble

Author(s)

Philippe Cote

Examples

```
## Not run:
getGenscapePipeOil(
  frequency = "daily", regions = "Canada", pipelineIDs = c(97),
  revision = "revised", limit = 5000, offset = 0,
  startDate = "2015-01-01", endDate = as.character(Sys.Date()),
  apikey = "yourapikey"
)

## End(Not run)
```

getGenscapeStorageOil *Genscape API call for oil storage*

Description

Returns oil storage data from Genscape API. You need your own credentials. Refer to API documentation for argument values. <https://developer.genscape.com/docs/services/oil-storage/operations/StorageVolumeByOwnerGet>

Usage

```

getGenscapeStorageOil(
  feed = "owner-volumes",
  regions = "Canada",
  products = "Crude",
  revision = "revised",
  limit = 5000,
  offset = 0,
  startDate = "2011-01-01",
  endDate = as.character(Sys.Date()),
  apikey = "yourapikey"
)

```

Arguments

feed	"owner-volumes" DEFAULT or "tank-volumes". character
regions	See API webpage. Multiple values separated by commas e.g. "Canada, Cushing"). character
products	See API webpage. Multiple values separated by commas e.g. "Crude, JetFuel"). character
revision	See API webpage. character
limit	See API webpage. Max 5000. numeric
offset	See API webpage. numeric
startDate	"yyyy-mm-dd". character
endDate	"yyyy-mm-dd". character
apikey	Your API key as a character string. character

Value

wide data frame tibble

Author(s)

Philippe Cote

Examples

```

## Not run:
# where yourapikey = "yourapikey".
getGenscapeStorageOil(
  feed = "owner-volumes", regions = "Canada", products = "Crude",
  revision = "revised", limit = 5000, offset = 0,
  startDate = "2011-01-01", endDate = "2020-11-01", apikey = yourapikey
)

## End(Not run)

```

`getGIS`*Extract and convert GIS data from a URL*

Description

Returns a `SpatialPointsDataFrame` from a shapefile URL. @section Examples with EIA and Government of Alberta

- from https://www.eia.gov/maps/layer_info-m.php :
- `crudepipelines <- getGIS(url = "https://www.eia.gov/maps/map_data/CrudeOil_Pipelines_US_EIA.zip")`
- `refineries <- getGIS(url = "https://www.eia.gov/maps/map_data/Petroleum_Refineries_US_EIA.zip")`
- from <https://gis.energy.gov.ab.ca/Geoview/OSPNG>
- `AB <- getGIS(url = "https://gis.energy.gov.ab.ca/GeoviewData/OS_Agreements_Shape.zip")`

Usage

```
getGIS(url = "https://www.eia.gov/maps/map_data/CrudeOil_Pipelines_US_EIA.zip")
```

Arguments

`url` URL of the zipped shapefile. character

Value

`SpatialPointsDataFrame`. `SpatialPolygonsDataFrame`

Author(s)

Philippe Cote

Examples

```
## Not run:  
getGIS(url = "https://www.eia.gov/maps/map_data/CrudeOil_Pipelines_US_EIA.zip")  
  
## End(Not run)
```

 getPrice

Morningstar Commodities API single call

Description

Returns data from Morningstar API. See below for current feeds supported. You need your own credentials with Morningstar. In examples sourced locally.

Usage

```
getPrice(
  feed = "CME_NymexFutures_EOD",
  contract = "@CL21Z",
  from = "2020-09-01",
  iuser = "x@xyz.com",
  ipassword = "pass"
)
```

Arguments

feed	Morningstar Feed Table. character
contract	Morningstar key. character
from	From date yyyy-mm-dd. character
iuser	Morningstar user name as character - sourced locally in examples. character
ipassword	Morningstar user password as character - sourced locally in examples. character

Value

wide data frame. tibble

Current Feeds Supported

- CME_CbotFuturesEOD and CME_CbotFuturesEOD_continuous
- CME_NymexFutures_EOD and CME_NymexFutures_EOD_continuous
- CME_NymexOptions_EOD
- CME_CmeFutures_EOD and CME_CmeFutures_EOD_continuous
- CME_Comex_FuturesSettlement_EOD and CME_Comex_FuturesSettlement_EOD_continuous
- LME_AskBidPrices_Delayed
- SHFE_FuturesSettlement_RT
- ICE_EuroFutures and ICE_EuroFutures_continuous
- ICE_NybotCoffeeSugarCocoaFutures and ICE_NybotCoffeeSugarCocoaFutures_continuous
- CME_STLCPC_Futures

- CFTC_CommitmentsOfTradersCombined. Requires multiple keys. Separate them by a space e.g. "N10 06765A NYME 01".
- Morningstar_FX_Forwards. Requires multiple keys. Separate them by a space e.g. "USD-CAD 2M".
- ERCOT_LmpsByResourceNodeAndElectricalBus.
- PJM_Rt_Hourly_Lmp.
- AESO_ForecastAndActualPoolPrice.

Author(s)

Philippe Cote

Examples

```
## Not run:
getPrice(
  feed = "CME_NymexFutures_EOD", contract = "@CL21Z",
  from = "2019-08-26", iuser = username, ipassword = password
)
getPrice(
  feed = "CME_NymexFutures_EOD_continuous", contract = "CL_006_Month",
  from = "2019-08-26", iuser = username, ipassword = password
)
getPrice(
  feed = "CME_NymexOptions_EOD", contract = "@LQ21ZP4000",
  from = "2020-03-15", iuser = username, ipassword = password
)
getPrice(
  feed = "CME_CbotFuturesEOD", contract = "C0Z",
  from = "2019-08-26", iuser = username, ipassword = password
)
getPrice(
  feed = "CME_CbotFuturesEOD_continuous", contract = "ZB_001_Month",
  from = "2019-08-26", iuser = username, ipassword = password
)
getPrice(
  feed = "CME_CmeFutures_EOD_continuous", contract = "HE_006_Month",
  from = "2019-08-26", iuser = username, ipassword = password
)
getPrice(
  feed = "Morningstar_FX_Forwards", contract = "USDCAD 2M",
  from = "2019-08-26", iuser = username, ipassword = password
)
getPrice(
  feed = "CME_CmeFutures_EOD", contract = "LH0N",
  from = "2019-08-26", iuser = username, ipassword = password
)
getPrice(
  feed = "CME_CmeFutures_EOD_continuous", contract = "HE_006_Month",
  from = "2019-08-26", iuser = username, ipassword = password
)
)
```

```

getPrice(
  feed = "ICE_EuroFutures", contract = "BRN0Z",
  from = "2019-08-26", iuser = username, ipassword = password
)
getPrice(
  feed = "ICE_EuroFutures_continuous", contract = "BRN_001_Month",
  from = "2019-08-26", iuser = username, ipassword = password
)
getPrice(
  feed = "ICE_NybotCoffeeSugarCocoaFutures", contract = "SB21H",
  from = "2019-08-26", iuser = username, ipassword = password
)
getPrice(
  feed = "ICE_NybotCoffeeSugarCocoaFutures_continuous", contract = "SF_001_Month",
  from = "2019-08-26", iuser = username, ipassword = password
)
getPrice(
  feed = "AESO_ForecastAndActualPoolPrice", contract = "Forecast_Pool_Price",
  from = "2021-04-01", iuser = username, ipassword = password
)
getPrice(
  feed = "LME_MonthlyDelayed_Derived", contract = "AHD 2021-12-01 2021-12-31",
  from = "2021-04-01", iuser = username, ipassword = password
)

## End(Not run)

```

getPrices

Morningstar Commodities API multiple calls

Description

Multiple Morningstar API calls using getPrice functions. Refer to getPrices() for list of currently supported data feeds.

Usage

```

getPrices(
  feed = "CME_NymexFutures_EOD",
  contracts = c("CL9Z", "CL0F", "CL0M"),
  from = "2019-01-01",
  iuser = "x@xyz.com",
  ipassword = "pass"
)

```

Arguments

feed Morningstar Feed Table. character

contracts	Symbols vector. character
from	From date yyyy-mm-dd. character
iuser	Morningstar user name as character - sourced locally in examples. character
ipassword	Morningstar user password as character - sourced locally in examples. character

Value

wide data frame. tibble

Author(s)

Philippe Cote

Examples

```
## Not run:
getPrices(
  feed = "CME_NymexFutures_EOD", contracts = c("@CL0Z", "@CL1F", "@CL21H", "@CL21Z"),
  from = "2020-01-01", iuser = username, ipassword = password
)

## End(Not run)
```

holidaysOil

dataset: NYMEX and ICE holiday calendars

Description

Holiday calendars for NYMEX and ICE Brent

Usage

```
holidaysOil
```

Format

data frame

Value

tibble

 npv

 NPV

Description

Computes NPV with discount factor interpolation. This function is used for teaching NPV and NPV at Risk and needs to be customized.

Usage

```
npv(
  init.cost = -375,
  C = 50,
  cf.freq = 0.25,
  TV = 250,
  T2M = 2,
  disc.factors = us.df,
  BreakEven = FALSE,
  BE.yield = 0.01
)
```

Arguments

<code>init.cost</code>	Initial investment cost. numeric
<code>C</code>	Periodic cash flow. numeric
<code>cf.freq</code>	Cash flow frequency in year fraction e.g. quarterly = 0.25. numeric
<code>TV</code>	Terminal Value. numeric
<code>T2M</code>	Time to Maturity in years. numeric
<code>disc.factors</code>	Data frame of discount factors using <code>ir.df.us()</code> function. numeric
<code>BreakEven</code>	TRUE when using a flat discount rate assumption. logical
<code>BE.yield</code>	Set the flat IR rate when <code>BreakEven = TRUE</code> . logical

Value

List of NPV and NPV Data frame. list

Author(s)

Philippe Cote

Examples

```

npv(
  init.cost = -375, C = 50, cf.freq = .5, TV = 250, T2M = 2,
  disc.factors = RTL::usSwapCurves, BreakEven = FALSE, BE.yield = .0399
)$npv
npv(
  init.cost = -375, C = 50, cf.freq = .5, TV = 250, T2M = 2,
  disc.factors = RTL::usSwapCurves, BreakEven = FALSE, BE.yield = .0399
)$df

```

ohlc

dataset: randomiser to convert settlement into OHLC

Description

OHLC profile using historical CL 1st Contract OHLC

Usage

```
ohlc
```

Format

data frame

Value

tibble

Source

CME

planets

dataset: IR compounding

Description

Planet metrics from NASA

Usage

```
planets
```

Format

data frame

Value

tibble

Source

<https://nssdc.gsfc.nasa.gov/planetary/factsheet/index.html>

promptBeta	<i>Computes betas of futures contracts with respect to the 1st line contract</i>
------------	--

Description

Returns betas of futures contracts versus front futures contract.

Usage

```
promptBeta(x = x, period = "all", betatype = "all", output = "chart")
```

Arguments

x	Wide dataframe with date column and multiple series columns (multivariate). tibble
period	"all" or numeric period of time in last n periods as character eg "100". character
betatype	"all" "bull" "bear". character
output	"betas" or "chart". character

Value

betas data frame tibble or plotly chart of betas htmlwidgets

Author(s)

Philippe Cote

Examples

```
## Not run:
x <- dflong %>%
  dplyr::filter(grepl("CL",series)) %>%
  dplyr::mutate(series = readr::parse_number(series)) %>% dplyr::group_by(series) %>%
  RTL::returns(df = ., retType = "abs",period.return = 1,spread = TRUE) %>%
  RTL::rolladjust(x = .,commodityname = c("cmewti"),rolltype = c("Last.Trade")) %>%
  # removing the day it prices went negative...
  dplyr::filter(!date %in% c(as.Date("2020-04-20"),as.Date("2020-04-21")))
promptBeta(x = x, period = "all", betatype = "all", output = "chart")
promptBeta(x = x, period = "all", betatype = "bull", output = "betas")
promptBeta(x = x, period = "100", betatype = "bear", output = "betas")
```

```
## End(Not run)
```

refineryLP	<i>LP model for refinery optimization</i>
------------	---

Description

Plain vanilla refinery optimization LP model.

Usage

```
refineryLP(
  crudes = RTL::refineryLPdata$inputs,
  products = RTL::refineryLPdata$outputs
)
```

Arguments

crudes	Data frame of crude inputs. tibble
products	Data frame of product outputs and max outputs. tibble

Value

Optimal crude slate and profits. tibble

Author(s)

Philippe Cote

Examples

```
refineryLP(crudes = RTL::refineryLPdata$inputs, products = RTL::refineryLPdata$outputs)
```

refineryLPdata	<i>dataset: refinery LP model sample inputs and outputs</i>
----------------	---

Description

Simple refinery to be used in running LP modeling for education purposes.

Usage

```
refineryLPdata
```

Format

list

Value

list

returns	<i>Compute absolute, relative or log returns.</i>
---------	---

Description

Computes periodic returns from a dataframe ordered by date

Usage

```
returns(df = dflong, retType = "abs", period.return = 1, spread = FALSE)
```

Arguments

df	Long dataframe with colnames = c("date","value","series"). character
retType	"abs" for absolute, "rel" for relative, or "log" for log returns. character
period.return	Number of rows over which to compute returns. numeric
spread	TRUE if you want to spread into a long dataframe. logical

Value

A dataframe object of returns. tibble

Author(s)

Philippe Cote

Examples

```
x <- dflong %>% dplyr::filter(grepl("CL01", series))
returns(df = x, retType = "abs", period.return = 1, spread = TRUE)
```

rolladjust	<i>Adjusts daily returns for futures contracts roll</i>
------------	---

Description

Returns a xts price or return object adjusted for contract roll. The methodology used to adjust returns is to remove the daily returns on the day after expiry and for prices to adjust historical rolling front month contracts by the size of the roll at each expiry. This is conducive to quantitative trading strategies as it reflects the PL of a financial trader.

Usage

```
rolladjust(x, commodityname = c("cmewti"), rolltype = c("Last.Trade"), ...)
```

Arguments

x	A df of returns.
commodityname	Name of commodity in expiry_table: unique(expiry_table\$cmdty) or "cmecan" for WCW
rolltype	Type of contract roll: "Last.Trade" or "First.Notice".
...	Other parms

Value

Roll-adjusted xts object of returns

Author(s)

Philippe Cote

Examples

```
ret <- dplyr::tibble(date = seq.Date(Sys.Date() - 60, Sys.Date(), 1), CL01 = rnorm(61, 0, 1))
rolladjust(x = ret, commodityname = c("cmewti"), rolltype = c("Last.Trade"))
```

simGBM	<i>GBM process simulation</i>
--------	-------------------------------

Description

Simulates a Geometric Brownian Motion process

Usage

```
simGBM(  
  nsims = 1,  
  S0 = 10,  
  drift = 0,  
  sigma = 0.2,  
  T2M = 1,  
  dt = 1/12,  
  vec = TRUE  
)
```

Arguments

nsims	number of simulations. Defaults to 1. numeric
S0	Spot price at t=0. numeric
drift	Drift term in percentage. numeric
sigma	Standard deviation. numeric
T2M	Maturity in years. numeric
dt	Time step in period e.g. 1/250 = 1 business day. numeric
vec	Vectorized implementation. Defaults to TRUE. logical

Value

A tibble of simulated values. tibble

Author(s)

Philippe Cote

Examples

```
simGBM(nsims = 2, S0 = 10, drift = 0, sigma = 0.2, T2M = 1, dt = 1 / 12, vec = TRUE)
```

simMultivariates	<i>Multivariate normal from historical dataset</i>
------------------	--

Description

Generates multivariate random epsilons using absolute returns.

Usage

```
simMultivariates(nsims = 10, x, s0 = NULL)
```

Arguments

nsims	Number of simulations. Defaults to 10. numeric
x	Wide data frame of prices with date as first column. tibble
s0	Vector of starting value for each variables. Defaults to NULL with zero. numeric

Value

List of means, sds, covariance matrix, correlation matrix and simulated values. list

Author(s)

Philippe Cote

Examples

```
simMultivariates(nsims = 10, x = RTL::fizdiffs, s0 = NULL)
```

simOU	<i>OU process simulation</i>
-------	------------------------------

Description

Simulates a Ornstein–Uhlenbeck process

Usage

```
simOU(  
  nsims = 2,  
  S0 = 5,  
  mu = 5,  
  theta = 0.5,  
  sigma = 0.2,  
  T2M = 1,  
  dt = 1/12,  
  epsilon = NULL  
)
```

Arguments

nsims	number of simulations. Defaults to 2. numeric
S0	S at t=0. numeric
mu	Mean reversion level. numeric
theta	Mean reversion speed. numeric
sigma	Standard deviation. numeric
T2M	Maturity in years. numeric

dt Time step size e.g. $1/250 = 1$ business day. numeric

epsilon Defaults to NULL function generates its own. numeric OPTIONAL: Array of epsilons for nsims = 1, if you want to feed your own e.g. in a multivariate context.

Value

Simulated values. tibble

Author(s)

Philippe Cote

Examples

```
simOU(nsims = 5, S0 = 5, mu = 5, theta = .5, sigma = 0.2, T2M = 1, dt = 1 / 12, epsilon = NULL)
simOU(nsims = 1, S0 = 5, mu = 5, theta = .5, sigma = 0.2, T2M = 1, dt = 1 / 12,
epsilon = matrix(rnorm(12,0,sqrt(1/12))))
simOU(nsims = 2, S0 = 5, mu = 5, theta = .5, sigma = 0.2, T2M = 1, dt = 1 / 12,
epsilon = replicate(2,rnorm(12,0,sqrt(1/12))))
```

simOUJ

OUJ process simulation

Description

Simulates a Ornstein–Uhlenbeck process with Jumps

Usage

```
simOUJ(
  nsims = 2,
  S0 = 5,
  mu = 5,
  theta = 10,
  sigma = 0.2,
  jump_prob = 0.05,
  jump_avesize = 2,
  jump_stdv = 0.05,
  T2M = 1,
  dt = 1/250
)
```

Arguments

nsims	number of simulations. Defaults to 2. numeric
S0	S at t=0. numeric
mu	Mean reversion level. numeric
theta	Mean reversion speed. numeric
sigma	Standard deviation. numeric
jump_prob	Probability of jumps. numeric
jump_avesize	Average size of jumps. numeric
jump_stdv	Standard deviation of jump average size. numeric
T2M	Maturity in years. numeric
dt	Time step size e.g. 1/250 = 1 business day. numeric

Value

Simulated values. tibble

Author(s)

Philippe Cote

Examples

```
simOUJ(nsims = 2, S0 = 5, mu = 5, theta = .5, sigma = 0.2,
jump_prob = 0.05, jump_avesize = 3, jump_stdv = 0.05,
T2M = 1, dt = 1 / 12)
```

simOUt

OU process simulation

Description

Simulates a Ornstein–Uhlenbeck process with mu as a function of time

Usage

```
simOUt(
  nsims = 2,
  S0 = 0,
  mu = dplyr::tibble(t = 0:20, mr = c(rep(2, 7), rep(4, 14))),
  theta = 12,
  sigma = 0.2,
  T2M = 1,
  dt = 1/12
)
```


Arguments

nsims	number of simulations. Defaults to 2. numeric
S0	S at t=0. numeric
mu	data frame of mean reversion level as a function of time. tibble
theta	Mean reversion speed. numeric
sigma	Standard deviation. numeric
T2M	Maturity in years. numeric
dt	Time step size e.g. 1/250 = 1 business day. numeric

Value

Simulated values. tibble

Author(s)

Philippe Cote

Examples

```
mu = dplyr::tibble(t = 0:20, mr = c(rep(2,7), rep(4,14)))
simOut(nsims = 2, S0 = 5, mu = mu, theta = .5, sigma = 0.2, T2M = 1, dt = 1 / 12)
```

spot2futConvergence *dataset: spot to futures convergence*

Description

Cash and futures

Usage

```
spot2futConvergence
```

Format

data frame

Value

tibble

Source

Morningstar, EIA

spot2futCurve *dataset: spot to futures convergence curve*

Description

Forward Curve

Usage

spot2futCurve

Format

data frame

Value

tibble

Source

Morningstar, EIA

steo *dataset: EIA Short Term Energy Outlook*

Description

Short Term Energy Outlook from the EIA.

Usage

steo

Format

plotly object

Value

htmlwidget

Source

eia

stocks	<i>dataset: Yahoo Finance data sets</i>
--------	---

Description

Traded equity prices and returns

Usage

stocks

Format

list

Value

list

Source

Yahoo Finance

swapCOM	<i>Commodity Calendar Month Average Swaps</i>
---------	---

Description

Commodity swap pricing from exchange settlement

Usage

```
swapCOM(  
  futures = futs,  
  futuresNames = c("CL0M", "CL0N"),  
  pricingDates = c("2020-05-01", "2020-05-30"),  
  contract = "cmewti",  
  exchange = "nymex"  
)
```

Arguments

futures	Wide data frame of futures prices for the given swap pricing dates. tibble
futuresNames	Tickers of relevant futures contracts. character
pricingDates	Vector of start and end pricing dates. See example. character
contract	Contract code in data(expiry_table). sort(unique(expiry_table\$comdty)) for options. character
exchange	Exchange code in data(holidaysOil). Currently only "nymex" and "ice" supported. character

Value

Data frame of historical swap prices. tibble

Author(s)

Philippe Cote

Examples

```
## Not run:
c <- paste0("CL0", c("M", "N", "Q"))
futs <- getPrices(
  feed = "CME_NymexFutures_EOD", contracts = c, from = "2019-08-26",
  iuser = username, ipassword = password
)
swapCOM(
  futures = futs, futuresNames = c("CL0M", "CL0N"),
  pricingDates = c("2020-05-01", "2020-05-30"), contract = "cmewti", exchange = "nymex"
)

## End(Not run)
```

swapFutWeight

Commodity Calendar Month Average Swap futures weights

Description

Returns the percentage weight of the future in Calendar Month Average swaps

Usage

```
swapFutWeight(
  Month = "2020-09-01",
  contract = "cmewti",
  exchange = "nymex",
  output = "first.fut.weight"
)
```

Arguments

Month	First calendar day of the month. character
contract	Contract code in data(expiry_table). sort(unique(expiry_table\$cmdty)) for options. character
exchange	Exchange code in data(holidaysOil). Currently only "nymex" and "ice" supported. character
output	Either "numDaysFut1", "numDaysFut2" or "first.fut.weight". character

Value

Depending on output setting. numeric If first.fut.weight, to compute swap 1 - first.fut.weight = % applied to 2nd line contract.

Author(s)

Philippe Cote

Examples

```
swapFutWeight(
  Month = "2020-09-01",
  contract = "cmewti", exchange = "nymex", output = "first.fut.weight"
)
```

swapInfo

Commodity Swap details to learn their pricing

Description

Returns dataframe required to price a WTI averaging instrument based on first line settlements.

Usage

```
swapInfo(
  date = "2023-08-24",
  feed = "CME_NymexFutures_EOD_continuous",
  ticker = "CL",
  contract = "cmewti",
  exchange = "nymex",
  iuser = "x@xyz.com",
  ipassword = "pass",
  output = "all"
)
```

Arguments

date	Character date as of which you want to extract daily settlement and forward values. character
feed	Feeds for Morningstar getCurve() and getPrice(). character
ticker	Nymex contract code. character
contract	Contract code in data(expiry_table). sort(unique(expiry_table\$cmdty)) for options. character
exchange	Exchange code in data(holidaysOil). Defaults to "nymex". character
iuser	Morningstar user name as character - sourced locally in examples. character
ipassword	Morningstar user password as character - sourced locally in examples. character
output	"chart" or "all". character

Value

Plot or a list of data frame and plot if output = "all". htmlwidget or list

Author(s)

Philippe Cote

Examples

```
## Not run:
swapInfo(
  date = "2020-05-06", feed = "CME_NymexFutures_EOD_continuous",
  ticker = "CL",
  contract = "cmewti", exchange = "nymex",
  iuser = "x@xyz.com", ipassword = "pass", output = "all"
)

## End(Not run)
```

 swapIRS

Interest Rate Swap

Description

Computes the mark to market of an IRS

Usage

```

swapIRS(
  trade.date = lubridate::today(),
  eff.date = lubridate::today() + 2,
  mat.date = lubridate::today() + 2 + lubridate::years(2),
  notional = 1e+06,
  PayRec = "Rec",
  fixed.rate = 0.05,
  float.curve = usSwapCurves,
  reset.freq = 3,
  disc.curve = usSwapCurves,
  convention = c("act", 360),
  bus.calendar = "NY",
  output = "price"
)

```

Arguments

trade.date	Date object. Defaults to today(). Date
eff.date	Date object. Defaults to today() + 2 days. Date
mat.date	Date object. Defaults to today() + 2 years. Date
notional	Numeric value of notional. Defaults to 1,000,000. numeric
PayRec	"Pay" or "Rec" fixed. character
fixed.rate	Numeric fixed interest rate. Defaults to 0.05. Date
float.curve	List of interest rate curves. Defaults to data("usSwapCurves"). list
reset.freq	Numeric where 1 = "monthly", 3 = quarterly, 6 = Semi annual 12 = yearly. character
disc.curve	List of interest rate curves. Defaults to data("usSwapCurves"). list
convention	Vector of convention e.g. c("act",360) c(30,360),... character
bus.calendar	Banking day calendar. Not implemented.
output	"price" for swap price or "all" for price, cash flow data frame, duration. character

Value

List of swap price, cash flow data frame, duration. list

Author(s)

Philippe Cote

Examples

```

data("usSwapCurves")
swapIRS(
  trade.date = as.Date("2020-01-04"), eff.date = as.Date("2020-01-06"),
  mat.date = as.Date("2022-01-06"), notional = 1000000,

```

```

PayRec = "Rec", fixed.rate = 0.05, float.curve = usSwapCurves, reset.freq = 3,
disc.curve = usSwapCurves, convention = c("act", 360),
bus.calendar = "NY", output = "all"
)

```

tickers_eia	<i>dataset: metadata of key EIA tickers grouped by products.</i>
-------------	--

Description

Supports automated upload of EIA data through its API by categories. Data frame organized by Supply Demand categories and products.

Usage

```
tickers_eia
```

Format

```
data frame
```

Value

```
tibble
```

tradeCycle	<i>dataset: Canadian and US physical crude trading calendars</i>
------------	--

Description

Crude Trading Trade Cycles. Note that is uses NYMEX calendar (WIP)

Usage

```
tradeCycle
```

Format

```
data frame
```

Value

```
tibble
```

tradeHubs	<i>dataset: GIS locations for crude oil trading hubs</i>
-----------	--

Description

Trading Hubs

Usage

tradeHubs

Format

data frame

Value

tibble

tradeprocess	<i>dataset: data for teaching the various ways to monetize a market call.</i>
--------------	---

Description

Data set for explaining the various ways to monetize a market view.

Usage

tradeprocess

Format

data frame

Value

tibble

tradeStats	<i>Risk-reward statistics for quant trading</i>
------------	---

Description

Compute list of risk reward metrics

Usage

```
tradeStats(x, Rf = 0)
```

Arguments

x	Univariate xts object of returns OR dataframe with date and return variables. xts
Rf	Risk-free rate. numeric

Value

List of risk/reward metrics. list

Author(s)

Philippe Cote

Examples

```
library(PerformanceAnalytics)
tradeStats(x = stocks$spy, Rf = 0)
```

tradeStrategyDY	<i>Sample quantitative trading strategy</i>
-----------------	---

Description

Based on dividend yield.

Usage

```
tradeStrategyDY(data, par1value = 50, par2value = 200)
```

Arguments

data	Dataframe of OHLC data e.g. RTL::uso. tibble
par1value	Value of first parameter e.g. short MA. numeric
par2value	Value of second parameter e.g. long MA. numeric

Value

Dataframe with indicators, signals, trades and profit and loss. tibble

Author(s)

Philippe Cote

Examples

```
tradeStrategyDY(data = RTL::stocks$ry, par1value = 50, par2value = 200)
```

tradeStrategySMA	<i>Sample quantitative trading strategy</i>
------------------	---

Description

Moving average crossover strategy

Usage

```
tradeStrategySMA(data = RTL::stocks$uso, par1value = 50, par2value = 200)
```

Arguments

data	Dataframe of OHLC data e.g. RTL::uso. tibble
par1value	Value of first parameter e.g. short MA. numeric
par2value	Value of second parameter e.g. long MA. numeric

Value

Dataframe with indicators, signals, trades and profit and loss. tibble

Author(s)

Philippe Cote

Examples

```
tradeStrategySMA(data = RTL::stocks$uso, par1value = 50, par2value = 200)
```

tsQuotes	<i>dataset: interest rate curve data for RQuantlib .</i>
----------	--

Description

USD IR curve input for RQuantlib::DiscountCurve

Usage

tsQuotes

Format

data frame

Value

tibble

usSwapCurves	<i>dataset: US bootstrapped interest rate curve.</i>
--------------	--

Description

USD IR Discount, Forward and Zero curves from RQuantlib::DiscountCurve

Usage

usSwapCurves

Format

List

Value

list

Source

Morningstar and FRED

usSwapCurvesPar	<i>dataset: US bootstrapped interest rate curve parallel sample.</i>
-----------------	--

Description

USD IR Discount, Forward and Zero curves from RQuantlib::DiscountCurve - Parallel toy data set

Usage

```
usSwapCurvesPar
```

Format

data frame

Value

tibble

wtiSwap	<i>dataset: WTI Calendar Month Average Swap pricing data</i>
---------	--

Description

WTI Crude futures

Usage

```
wtiSwap
```

Format

data frame

Value

tibble

Source

Morningstar

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