Package ‘fmbasics’

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Type Package

Title Financial Market Building Blocks

Version 0.3.0

Description Implements basic financial market objects like currencies, currency pairs, interest rates and interest rate indices. You will be able to use Benchmark instances of these objects which have been defined using their most common conventions or those defined by International Swap Dealer Association (ISDA, <https://www.isda.org>) legal documentation.

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URL https://github.com/imanuelcostigan/fmbasics, https://imanuelcostigan.github.io/fmbasics/

BugReports https://github.com/imanuelcostigan/fmbasics/issues

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R topics documented:

as_DiscountFactor *Coerce to DiscountFactor*

Description

You can coerce objects to the `DiscountFactor` class using this method.

Usage

```
as_DiscountFactor(x, ...)

## S3 method for class 'InterestRate'
as_DiscountFactor(x, d1, d2, ...)
```

Arguments

`x`	object to coerce
`...`	other parameters passed to methods
`d1`	a `Date` vector containing the as of date
`d2`	a `Date` vector containing the date to which the discount factor applies

Value

a `DiscountFactor` object

Examples

```
library("lubridate")
as_DiscountFactor(InterestRate(c(0.04, 0.05), c(2, 4), 'act/365'),
  ymd(20140101), ymd(20150101))
```

as_InterestRate *Coerce to InterestRate*

Description

You can coerce objects to the `InterestRate` class using this method.

Usage

```
as_InterestRate(x, ...)

## S3 method for class 'DiscountFactor'
as_InterestRate(x, compounding, day_basis, ...)

## S3 method for class 'InterestRate'
as_InterestRate(x, compounding = NULL,
  day_basis = NULL, ...)
```

Arguments

`x`	object to coerce
`...`	other parameters passed to methods
`compounding`	a numeric vector representing the compounding frequency.
`day_basis`	a character vector representing the day basis associated with the interest rate (see `fmdates::year_frac()`)

Value

an `InterestRate` object

Examples

```
library("lubridate")
as_InterestRate(DiscountFactor(0.95, ymd(20130101), ymd(20140101)),
  compounding = 2, day_basis = "act/365")
as_InterestRate(InterestRate(c(0.04, 0.05), c(2, 4), 'act/365'),
  compounding = 4, day_basis = 'act/365')
```

`as_tibble.ZeroCurve` *ZeroCurve attributes as a data frame*

Description

Create a `tibble` that contains the pillar point maturities in years (using the `act/365` convention) and the corresponding continuously compounded zero rates.

Usage

```
## S3 method for class 'ZeroCurve'
as_tibble(x, ...)
```

Arguments

`x`	a `ZeroCurve` object
`...`	other parameters that are not used by this methods

Value

a `tibble` with two columns named `Years` and `Zeros`.

See Also

`tibble::tibble()`

Examples

```
library(tibble)
zc <- build_zero_curve()
as_tibble(zc)
```

---

build_zero_curve — *Build a* `ZeroCurve` *from example data set*

Description

This creates a `ZeroCurve` object from the example data set `zerocurve.csv`.

Usage

```
build_zero_curve(interpolation = NULL)
```

Arguments

`interpolation`	an `Interpolation` object

Value

a `ZeroCurve` object using data from `zerocurve.csv`

Examples

```
build_zero_curve(LogDFInterpolation())
```

CashFlow — *Create a CashFlow*

Description

This allows you to create a `CashFlow` object.

Usage

```
CashFlow(dates, monies)
```

Arguments

`dates`	a Date vector with either the same length as `monies` or a vector of length one that is recycled
`monies`	a MultiCurrencyMoney object

Value

a `CashFlow` object that extends `tibble::tibble()`

See Also

Other money functions: `MultiCurrencyMoney`, `SingleCurrencyMoney`, `is.CashFlow`, `is.MultiCurrencyMoney`, `is.SingleCurrencyMoney`

Examples

```
CashFlow(as.Date("2017-11-15"),
  MultiCurrencyMoney(list(SingleCurrencyMoney(1, AUD())))
)
```

CashIndex *CashIndex class*

Description

This can be used to represent ONIA like indices (e.g. AONIA, FedFunds) and extends the `InterestRateIndex` class.

Usage

```
CashIndex(name, currency, spot_lag, calendar, day_basis, day_convention)
```

Arguments

`name`	the name of the index as a string
`currency`	the currency associated with the index as a Currency object
`spot_lag`	the period between the index's fixing and the start of the index's term
`calendar`	the calendar used to determine whether the index fixes on a given date as a Calendar
`day_basis`	the day basis associated with the index (e.g. "act/365")
`day_convention`	the day convention associated with the index (e.g. "mf")

Value

an object of class `CashIndex` that inherits from `Index`

Examples

```
library(lubridate)
library(fmdates)
# RBA cash overnight rate
CashIndex("AONIA", AUD(), days(0), c(AUSYCalendar()), "act/365", "f")
```

`Currency` *Build a Currency*

Description

A currency refers to money in any form when in actual use or circulation, as a medium of exchange, especially circulating paper money. This package includes handy constructors for common currencies.

Usage

```
Currency(iso, calendar)
```

Arguments

`iso`	a three letter code representing the currency (see ISO4217)
`calendar`	a JointCalendar

Value

an object of class `Currency`

References

Currency. (2014, March 3). In Wikipedia

See Also

CurrencyConstructors

Examples

```
library("fmdates")
Currency("AUD", c(AUSYCalendar()))
```

`CurrencyConstructors` *Handy Currency constructors*

Description

These constructors use the following conventions:

Usage

```
AUD()

EUR()

GBP()

JPY()

NZD()

USD()

CHF()

HKD()

NOK()
```

Details

Creator	Joint calendars
AUD()	AUSYCalendar
EUR()	EUTACalendar
GBP()	GBLOCalendar
JPY()	JPTOCalendar
NZD()	NZAUCalendar, NZWECalendar
USD()	USNYCalendar
CHF()	CHZHCalendar
HKD()	HKHKCalendar
NOK()	NOOSCalendar

See Also

Other constructors: CurrencyPairConstructors, iborindices, oniaindices

Examples

```
AUD()
```

CurrencyPair *CurrencyPair class*

Description

Create an object of class `CurrencyPair`

Usage

```
CurrencyPair(base_ccy, quote_ccy, calendar = NULL)
```

Arguments

`base_ccy`	a Currency object
`quote_ccy`	a Currency object
`calendar`	a JointCalendar object. Defaults to `NULL` which sets this to the joint calendar of the two currencies and removes any USNYCalendar object to allow currency pair methods to work correctly

Value

a `CurrencyPair` object

Examples

```
CurrencyPair(AUD(), USD())
```

`CurrencyPairConstructors`
Handy CurrencyPair constructors

Description

These handy `CurrencyPair` constructors use their single currency counterparts in the obvious fashion.

Usage

```
AUDUSD()

EURUSD()

NZDUSD()

GBPUSD()

USDJPY()

GBPJPY()

EURGBP()
```

```
AUDNZD()

EURCHF()

USDCHF()

USDHKD()

EURNOK()

USDNOK()
```

See Also

Other constructors: CurrencyConstructors, iborindices, oniaindices

Examples

```
AUDUSD()
```

CurrencyPairMethods *CurrencyPair methods*

Description

A collection of methods related to currency pairs.

Usage

```
is_t1(x)

to_spot(dates, x)

to_spot_next(dates, x)

to_forward(dates, tenor, x)

to_today(dates, x)

to_tomorrow(dates, x)

to_fx_value(dates, tenor, x)

invert(x)
```

Arguments

`x`	a `CurrencyPair` object
`dates`	a vector of dates from which forward dates are calculated
`tenor`	the tenor of the value date which can be one of the following: "spot", "spot_next", "today", "tomorrow" and the usual "forward" dates (e.g. `lubridate::months(3)`)

Details

The methods are summarised as follows:

- `is_t1`: Returns `TRUE` if the currency pair settles one good day after trade. This includes the following currencies crossed with the USD: CAD, TRY, PHP, RUB, KZT and PKR
- `to_spot`: The spot dates are usually two non-NY good day after today. `is_t1()` identifies the pairs whose spot dates are conventionally one good non-NYC day after today. In both cases, if those dates are not a good NYC day, they are rolled to good NYC and non-NYC days using the Following convention.
- `to_spot_next`: The spot next dates are one good NYC and non-NYC day after spot rolled using the Following convention if necessary.
- `to_forward`: Forward dates are determined using the calendar's `shift()` method rolling bad NYC and non-NYC days using the Following convention. The end-to-end convention applies.
- `to_today`: Today is simply dates which are good NYC and non-NYC days. Otherwise today is undefined and returns `NA`.
- `to_tomorrow`: Tomorrow is one good NYC and non-NYC day except where that is on or after spot. In that case, is is undefined and returns `NA`.
- `to_value`: Determine common value dates. The supported value date `tenors` are: "spot", "spot_next", "today", "tomorrow" and the usual "forward" dates (e.g. `lubridate::months(3)`).
- `invert`: Inverts the currency pair and returns new `CurrencyPair` object.
- `is.CurrencyPair`: Returns `TRUE` if `x` inherits from the `CurrencyPair` class; otherwise `FALSE`

Examples

```
library(lubridate)
is_t1(AUDUSD())
dts <- lubridate::ymd(20170101) + lubridate::days(0:30)
to_spot(dts, AUDUSD())
to_spot_next(dts, AUDUSD())
to_today(dts, AUDUSD())
to_tomorrow(dts, AUDUSD())
to_fx_value(dts, months(3), AUDUSD())
```

DiscountFactor *DiscountFactor class*

Description

The `DiscountFactor` class is designed to represent discount factors. Checks whether: `d1` is less than `d2`, elementwise, and that both are `Date` vectors; and `value` is greater than zero and is a numeric vector. An error is thrown if any of these are not true. The elements of each argument are recycled such that each resulting vectors have equivalent lengths.

Usage

```
DiscountFactor(value, d1, d2)
```

Arguments

`value`	a numeric vector containing discount factor values. Must be greater than zero
`d1`	a `Date` vector containing the as of date
`d2`	a `Date` vector containing the date to which the discount factor applies

Value

a (vectorised) `DiscountFactor` object

Examples

```
library("lubridate")
df <- DiscountFactor(c(0.95, 0.94, 0.93), ymd(20130101), ymd(20140101, 20150101))
as_InterestRate(df, 2, "act/365")
```

DiscountFactor-operators `DiscountFactor` *operations*

Description

A number of different operations can be performed on or with `DiscountFactor` objects. Methods have been defined for base package generic operations including arithmetic and comparison.

Details

The operations are:

- `c`: concatenates a vector of `DiscountFactor` objects
- `[`: extract parts of a `DiscountFactor` vector
- `[<-`: replace parts of a `DiscountFactor` vector
- `rep`: repeat a `DiscountFactor` object
- `length`: determines the length of a `DiscountFactor` vector
- `*`: multiplication of `DiscountFactor` objects. The end date of the first discount factor object must be equivalent to the start date of the second (or vice versa). Arguments are recycled as necessary.
- `/`: division of `DiscountFactor` objects. The start date date of both arguments must be the same. Arguments are recycled as necessary.
- `<, >, <=, >=, ==, !=`: these operate in the standard way on the `discount_factor` field.

`fmbasics` *fmbasics: Financial Market Building Blocks*

Description

Implements basic financial market objects like currencies, currency pairs, interest rates and interest rate indices. You will be able to use Benchmark instances of these objects which have been defined using their most common conventions or those defined by International Swap Dealer Association legal documentation.

`IborIndex` *IborIndex class*

Description

This can be used to represent IBOR like indices (e.g. LIBOR, BBSW, CDOR) and extends the `Index` class.

Usage

```
IborIndex(name, currency, tenor, spot_lag, calendar, day_basis, day_convention,
  is_eom)
```

Arguments

`name`	the name of the index as a string
`currency`	the currency associated with the index as a Currency object
`tenor`	the term of the index as a period
`spot_lag`	the period between the index's fixing and the start of the index's term
`calendar`	the calendar used to determine whether the index fixes on a given date as a Calendar
`day_basis`	the day basis associated with the index (e.g. "act/365")
`day_convention`	the day convention associated with the index (e.g. "mf")
`is_eom`	a flag indicating whether or not the maturity date of the index is subject to the end-to-end convention.

Value

an object of class `IborIndex` that inherits from `Index`

Examples

```
library(lubridate)
library(fmdates)
# 3m AUD BBSW
IborIndex("BBSW", AUD(), months(3), days(0), c(AUSYCalendar()),
  "act/365", "ms", FALSE)
```

---

iborindices *Standard IBOR*

Description

These functions create commonly used IBOR indices with standard market conventions.

Usage

```
AUDBBSW(tenor)

AUDBBSW1b(tenor)

EURIBOR(tenor)

GBPLIBOR(tenor)

JPYLIBOR(tenor)

JPYTIBOR(tenor)
```

```
NZDBKBM(tenor)

USDLIBOR(tenor)

CHFLIBOR(tenor)

HKDHIBOR(tenor)

NOKNIBOR(tenor)
```

Arguments

`tenor`	the tenor of the IBOR index (e.g. `months(3)`)

Details

The key conventions are tabulated below.

Creator	Spot lag (days)	Fixing calendars	Day basis	Day convention	EOM
AUDBBSW()	0	AUSYCalendar	act/365	ms	FALSE
EURIBOR()	2	EUTACalendar	act/360	mf	TRUE
GBPLIBOR()	0	GBLOCalendar	act/365	mf	TRUE
JPYLIBOR()	2	GBLOCalendar	act/360	mf	TRUE
JPYTIBOR()	2	JPTOCalendar	act/365	mf	FALSE
NZDBKBM()	0	NZWECalendar, NZAUCalendar	act/365	mf	FALSE
USDLIBOR()	2	USNYCalendar, GBLOCalendar	act/360	mf	TRUE
CHFLIBOR()	2	GBLOCalendar	act/360	mf	TRUE
HKDHIBOR()	0	HKHKCalendar	act/365	mf	FALSE
NOKNIBOR()	2	NOOSCalendar	act/360	mf	FALSE

There are some nuances to this. Sub-1m LIBOR and TIBOR spot lags are zero days (excepting spot-next rates) and use the following day convention and the overnight USDLIBOR index uses both USNYCalendar and GBLOCalendar calendars.

References

BBSW EURIBOR ICE LIBOR BBA LIBOR TIBOR NZD BKBM OpenGamma Interest Rate Instruments and Market Conventions Guide HKD HIBOR

See Also

Other constructors: `CurrencyConstructors`, `CurrencyPairConstructors`, `oniaindices`

`indexcheckers` *Index class checkers*

Description

Index class checkers

Usage

```
is.Index(x)

is.IborIndex(x)

is.CashIndex(x)
```

Arguments

x	an object

Value

TRUE if object inherits from tested class

Examples

```
is.Index(AONIA())
is.CashIndex(AONIA())
is.IborIndex(AONIA())
```

---

indexshifters *Index date shifters*

Description

A collection of methods that shift dates according to index conventions.

Usage

```
to_reset(dates, index)

to_value(dates, index)

to_maturity(dates, index)

## Default S3 method:
to_reset(dates, index)

## Default S3 method:
to_value(dates, index)

## Default S3 method:
to_maturity(dates, index)
```

Arguments

`dates`	a vector of dates to shift
`index`	an instance of an object that inherits from the `Index` class.

Details

The following describes the default methods. `to_reset()` treats the input dates as value dates and shifts these to the corresponding reset or fixing dates using the index's spot lag; `to_value()` treats the input dates as reset or fixing dates and shifts them to the corresponding value dates using the index's spot lag; and `to_maturity()` treats the input dates as value dates and shifts these to the index's corresponding maturity date using the index's tenor.

Value

a vector of shifted dates

Examples

```
library(lubridate)
to_reset(ymd(20170101) + days(0:30), AUDBBSW(months(3)))
to_value(ymd(20170101) + days(0:30), AUDBBSW(months(3)))
to_maturity(ymd(20170101) + days(0:30), AUDBBSW(months(3)))
```

`InterestRate` *InterestRate class*

Description

The `InterestRate` class is designed to represent interest rates. Checks whether: the `day_basis` is valid; and the `compounding` is valid. An error is thrown if any of these are not true. The elements of each argument are recycled such that each resulting vectors have equivalent lengths.

Usage

```
InterestRate(value, compounding, day_basis)
```

Arguments

`value`	a numeric vector containing interest rate values (as decimals).
`compounding`	a numeric vector representing the compounding frequency.
`day_basis`	a character vector representing the day basis associated with the interest rate (see `fmdates::year_frac()`)

Value

a vectorised `InterestRate` object

Examples

```
library("lubridate")
InterestRate(c(0.04, 0.05), c(2, 4), 'act/365')
rate <- InterestRate(0.04, 2, 'act/365')
as_DiscountFactor(rate, ymd(20140101), ymd(20150101))
as_InterestRate(rate, compounding = 4, day_basis = 'act/365')
```

InterestRate-operators

InterestRate *operations*

Description

A number of different operations can be performed on or with InterestRate objects. Methods have been defined for base package generic operations including arithmetic and comparison.

Details

The operations are:

- c: concatenates a vector of InterestRate objects
- [: extract parts of a InterestRate vector
- [<-: replace parts of a InterestRate vector
- rep: repeat a InterestRate object
- length: determines the length of a InterestRate vector
- +, -: addition/subtraction of InterestRate objects. Where two InterestRate objects are added/subtracted, the second is first converted to have the same compounding and day basis frequency as the first. Numeric values can be added/subtracted to/from an InterestRate object by performing the operation directly on the rate field. Arguments are recycled as necessary.
- *: multiplication of InterestRate objects. Where two InterestRate objects are multiplied, the second is first converted to have the same compounding and day basis frequency as the first. Numeric values can be multiplied to an InterestRate object by performing the operation directly on the rate field. Arguments are recycled as necessary.
- /: division of InterestRate objects. Where two InterestRate objects are divided, the second is first converted to have the same compounding and day basis frequency as the first. Numeric values can divide an InterestRate object by performing the operation directly on the rate field. Arguments are recycled as necessary.
- <, >, <=, >=, ==, !=: these operate in the standard way on the rate field, and if necessary, the second InterestRate object is converted to have the same compounding and day basis frequency as the first.

`interpolate` *Interpolate values from an object*

Description

Interpolate values from an object

Usage

```
interpolate(x, ...)
```

Arguments

`x`	the object to interpolate.
`...`	other parameters that defines how to interpolate the object

Value

an interpolated value or set of values

See Also

Other interpolate functions: `interpolate.ZeroCurve`, `interpolate_dfs`, `interpolate_zeros`

`interpolate.ZeroCurve` *Interpolate a* `ZeroCurve`

Description

There are two key interpolation schemes available in the `stats` package: constant and linear interpolation via `stats::approxfun()` and spline interpolation via `stats::splinefun()`. The `interpolate()` method is a simple wrapper around these methods that are useful for the purposes of interpolation financial market objects like zero coupon interest rate curves.

Usage

```
## S3 method for class 'ZeroCurve'
interpolate(x, at, ...)
```

Arguments

`x`	a `ZeroCurve` object
`at`	a non-negative numeric vector representing the years at which to interpolate the zero curve
`...`	unused in this method

Value

a numeric vector of zero rates (continuously compounded, act/365)

See Also

Other interpolate functions: `interpolate_dfs`, `interpolate_zeros`, `interpolate`

Examples

```
zc <- build_zero_curve(LogDFInterpolation())
interpolate(zc, c(1.5, 3))
```

`interpolate_dfs` *Interpolate forward rates and discount factors*

Description

This interpolates forward rates and forward discount factors from either a ZeroCurve or some other object that contains such an object.

Usage

```
interpolate_dfs(x, from, to, ...)

interpolate_fwds(x, from, to, ...)

## S3 method for class 'ZeroCurve'
interpolate_fwds(x, from, to, ...)

## S3 method for class 'ZeroCurve'
interpolate_dfs(x, from, to, ...)
```

Arguments

`x`	the object to interpolate
`from`	a Date vector representing the start of the forward period
`to`	a Date vector representing the end of the forward period
`...`	further arguments passed to specific methods

Value

`interpolate_dfs` returns a DiscountFactor object of forward discount factors while `interpolate_fwds` returns an InterestRate object of interpolated simply compounded forward rates.

See Also

Other interpolate functions: `interpolate.ZeroCurve`, `interpolate_zeros`, `interpolate`

interpolate_zeros *Interpolate zeros*

Description

This interpolates zero rates from either a ZeroCurve or some other object that contains such an object.

Usage

```
interpolate_zeros(x, at, compounding = NULL, day_basis = NULL, ...)

## S3 method for class 'ZeroCurve'
interpolate_zeros(x, at, compounding = NULL,
  day_basis = NULL, ...)
```

Arguments

`x`	the object to interpolate
`at`	a Date vector representing the date at which to interpolate a value
`compounding`	a valid compounding string. Defaults to `NULL` which uses the curve's native compounding basis
`day_basis`	a valid day basis string. Defaults to `NULL` which uses the curve's native day basis.
`...`	further arguments passed to specific methods

Value

an InterestRate object of interpolated zero rates with the `compounnding` and `day_basis` requested.

See Also

Other interpolate functions: `interpolate.ZeroCurve`, `interpolate_dfs`, `interpolate`

Interpolation *Interpolation*

Description

These are lightweight interpolation classes that are used to specify typical financial market interpolation schemes. Their behaviour is dictated by the object in which they defined.

Usage

```
ConstantInterpolation()

LogDFInterpolation()

LinearInterpolation()

CubicInterpolation()
```

Value

an object that inherits from the `Interpolation` class.

Examples

```
ConstantInterpolation()
```

---

is.CashFlow *Inherits from CashFlow*

Description

Checks whether object inherits from `CashFlow` class

Usage

```
is.CashFlow(x)
```

Arguments

x	an R object

Value

`TRUE` if `x` inherits from the `CashFlow` class; otherwise `FALSE`

See Also

Other money functions: `CashFlow`, `MultiCurrencyMoney`, `SingleCurrencyMoney`, `is.MultiCurrencyMoney`, `is.SingleCurrencyMoney`

Examples

```
is.CashFlow(CashFlow(as.Date("2017-11-15"),
  MultiCurrencyMoney(list(SingleCurrencyMoney(1, AUD())))))
```

is.Currency *Inherits from Currency*

Description

Checks whether object inherits from `Currency` class

Usage

```
is.Currency(x)
```

Arguments

`x`	an R object

Value

`TRUE` if `x` inherits from the `Currency` class; otherwise `FALSE`

Examples

```
is.Currency(AUD())
```

is.CurrencyPair *Inherits from `CurrencyPair` class*

Description

Inherits from `CurrencyPair` class

Usage

```
is.CurrencyPair(x)
```

Arguments

`x`	an R object

Value

`TRUE` if `x` inherits from the `CurrencyPair` class; otherwise `FALSE`

Examples

```
is.CurrencyPair(AUDUSD())
```

is.DiscountFactor *Inherits from DiscountFactor*

Description

Checks whether object inherits from `DiscountFactor` class

Usage

```
is.DiscountFactor(x)
```

Arguments

x	an R object

Value

`TRUE` if `x` inherits from the `DiscountFactor` class; otherwise `FALSE`

Examples

```
is.DiscountFactor(DiscountFactor(0.97, Sys.Date(), Sys.Date() + 30))
```

is.InterestRate *Inherits from InterestRate*

Description

Checks whether object inherits from `InterestRate` class

Usage

```
is.InterestRate(x)
```

Arguments

x	an R object

Value

`TRUE` if `x` inherits from the `InterestRate` class; otherwise `FALSE`

Examples

```
is.InterestRate(InterestRate(0.04, 2, "act/365"))
```

is.Interpolation *Check Interpolation class*

Description

These methods check whether an interpolation is of a particular scheme.

Usage

```
is.Interpolation(x)

is.ConstantInterpolation(x)

is.LogDFInterpolation(x)

is.LinearInterpolation(x)

is.CubicInterpolation(x)
```

Arguments

`x`	an object

Value

a logical flag

Examples

```
is.Interpolation(CubicInterpolation())
is.CubicInterpolation(CubicInterpolation())
```

is.MultiCurrencyMoney *Inherits from MultiCurrencyMoney*

Description

Checks whether object inherits from `MultiCurrencyMoney` class

Usage

```
is.MultiCurrencyMoney(x)
```

Arguments

`x`	an R object

Value

TRUE if x inherits from the MultiCurrencyMoney class; otherwise FALSE

See Also

Other money functions: CashFlow, MultiCurrencyMoney, SingleCurrencyMoney, is.CashFlow, is.SingleCurrencyMoney

Examples

```
is.MultiCurrencyMoney(MultiCurrencyMoney(list(SingleCurrencyMoney(1, AUD()))))
```

---

is.SingleCurrencyMoney   *Inherits from SingleCurrencyMoney*

Description

Checks whether object inherits from SingleCurrencyMoney class

Usage

```
is.SingleCurrencyMoney(x)
```

Arguments

x	an R object

Value

TRUE if x inherits from the SingleCurrencyMoney class; otherwise FALSE

See Also

Other money functions: CashFlow, MultiCurrencyMoney, SingleCurrencyMoney, is.CashFlow, is.MultiCurrencyMoney

Examples

```
is.SingleCurrencyMoney(SingleCurrencyMoney(1:5, AUD()))
```

`is.ZeroCurve` *Inherits from ZeroCurve*

Description

Checks whether object inherits from `ZeroCurve` class

Usage

```
is.ZeroCurve(x)
```

Arguments

`x`	an R object

Value

`TRUE` if `x` inherits from the `ZeroCurve` class; otherwise `FALSE`

Examples

```
is.ZeroCurve(build_zero_curve())
```

`iso.CurrencyPair` *Get ISO*

Description

The default method assumes the ISO can be accessed as if it were an attribute with name `iso` (e.g. `x$iso`). The method for `CurrencyPair` concatenates the ISOs of the constituent currencies (e.g. `iso(AUDUSD())` returns "AUDUSD") while the methods for `CashIndex` and `IborIndex` return the ISO of the index's currency.

Usage

```
## S3 method for class 'CurrencyPair'
iso(x)

iso(x)

## Default S3 method:
iso(x)

## S3 method for class 'IborIndex'
iso(x)

## S3 method for class 'CashIndex'
iso(x)
```

Arguments

`x`	object from which to extract an ISO

Value

a string of the ISO

Examples

```
library("lubridate")
iso(AUD())
iso(AUDUSD())
iso(AUDBBSW(months(3)))
iso(AONIA())
```

`is_valid_compounding` *Compounding frequencies*

Description

A non-exported function that checks whether compounding values frequencies are supported.

Usage

```
is_valid_compounding(compounding)
```

Arguments

`compounding`	a numeric vector representing the compounding frequency

Details

Valid compounding values are:

Value	Frequency
-1	Simply, T-bill discounting
0	Simply
1	Annually
2	Semi-annually
3	Tri-annually
4	Quarterly
6	Bi-monthly
12	Monthly
24	Fortnightly
52	Weekly
365	Daily
Inf	Continuously

Value

a flag (TRUE or FALSE) if all the supplied compounding frequencies are supported.

MultiCurrencyMoney *MultiCurrencyMoney*

Description

This class associates a vector of numeric values with a list of currencies. This can be useful for example to store value of cash flows. Internally it represents this information as an extension to a tibble. You are able to bind MultiCurrencyMoney objects by using rbind() (see example below).

Usage

```
MultiCurrencyMoney(monies)
```

Arguments

monies	a list of SingleCurrencyMoney

Value

a MultiCurrencyMoney object that extends tibble::tibble()

See Also

Other money functions: CashFlow, SingleCurrencyMoney, is.CashFlow, is.MultiCurrencyMoney, is.SingleCurrencyMoney

Examples

```
mcm <- MultiCurrencyMoney(list(
  SingleCurrencyMoney(1, AUD()),
  SingleCurrencyMoney(2, USD())
))
rbind(mcm, mcm)
```

`oniaindices` *Standard ONIA*

Description

These functions create commonly used ONIA indices with standard market conventions.

Usage

```
AONIA()

EONIA()

SONIA()

TONAR()

NZIONA()

FedFunds()

CHFTOIS()

HONIX()
```

Details

The key conventions are tabulated below. All have a zero day spot lag excepting `CHFTOIS` which has a one day lag (it is a tom-next rate, per 2006 ISDA definitions).

Creator	**Fixing calendars**	**Day basis**	**Day convention**
AONIA()	AUSYCalendar	act/365	f
EONIA()	EUTACalendar	act/360	f
SONIA()	GBLOCalendar	act/365	f
TONAR()	JPTOCalendar	act/365	f
NZIONA()	NZWECalendar, NZAUCalendar	act/365	f
FedFunds()	USNYCalendar	act/360	f
CHFTOIS()	CHZHCalendar	act/360	f
HONIX()	HKHKCalendar	act/365	f

Note that for some ONIA indices, the overnight rate is not published until the following date (i.e. it has publication lag of one day).

References

AONIA EONIA SONIA TONAR NZIONA FedFunds OpenGamma Interest Rate Instruments and

Market Conventions Guide

See Also

Other constructors: `CurrencyConstructors`, `CurrencyPairConstructors`, `iborindices`

`SingleCurrencyMoney` *SingleCurrencyMoney*

Description

This class associates a numeric vector with a currency. This is useful for example in representing the value of a derivative. You can concatenate a set `SingleCurrencyMoney` objects and return a MultiCurrencyMoney object (see example below)

Usage

```
SingleCurrencyMoney(value, currency)
```

Arguments

`value`	a numeric vector of values
`currency`	a single Currency object

Value

a `SingleCurrencyMoney` object

See Also

Other money functions: `CashFlow`, `MultiCurrencyMoney`, `is.CashFlow`, `is.MultiCurrencyMoney`, `is.SingleCurrencyMoney`

Examples

```
SingleCurrencyMoney(1:5, AUD())
c(SingleCurrencyMoney(1, AUD()), SingleCurrencyMoney(100, USD()))
```

ZeroCurve *ZeroCurve class*

Description

A class that defines the bare bones of a zero-coupon yield curve pricing structure.

Usage

```
ZeroCurve(discount_factors, reference_date, interpolation)
```

Arguments

`discount_factors`
: a `DiscountFactor` object. These are converted to continuously compounded zero coupon interest rates with an `act/365` day basis for internal storage purposes

`reference_date`
: a `Date` object

`interpolation`
: an `Interpolation` object

Details

A term structure of interest rates (or yield curve) is a curve showing several yields or interest rates across different contract lengths (2 month, 2 year, 20 year, etc...) for a similar debt contract. The curve shows the relation between the (level of) interest rate (or cost of borrowing) and the time to maturity, known as the "term", of the debt for a given borrower in a given currency. For example, the U.S. dollar interest rates paid on U.S. Treasury securities for various maturities are closely watched by many traders, and are commonly plotted on a graph. More formal mathematical descriptions of this relation are often called the term structure of interest rates. When the effect of coupons on yields are stripped away, one has a zero-coupon yield curve.

The following interpolation schemes are supported by `ZeroCurve`: `ConstantInterpolation`, `LinearInterpolation`, `LogDFInterpolation` and `CubicInterpolation`. Points outside the calibration region use constant extrapolation on the zero rate.

Value

a `ZeroCurve` object

See Also

Interpolation

Examples

```
build_zero_curve()
```

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