# Package ‘timetk’

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**Type** Package

**Title** A Tool Kit for Working with Time Series in R

**Version** 0.1.0

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**Description** Get the time series index, signature, and summary from time series objects and time-based tibbles. Create future time series based on properties of existing time series index. Coerce between time-based tibbles ('tbl') and 'xts', 'zoo', and 'ts'.

**URL** https://github.com/business-science/timetk

**BugReports** https://github.com/business-science/timetk/issues

**License** GPL (>= 3)

**Encoding** UTF-8

**LazyData** true

**Depends** R (>= 3.3.0)

**Imports** devtools (>= 1.12.0), dplyr (>= 0.7.0), forecast (>= 0.8.0), lazyeval (>= 0.2.0), lubridate (>= 1.6.0), padr (>= 0.3.0), purrr (>= 0.2.2), readr (>= 1.0.0), stringi (>= 1.1.5), tibble (>= 1.2), tidyr (>= 0.6.1), xts (>= 0.9-7), zoo (>= 1.7-14)

**Suggests** broom, forcats, knitr, rmarkdown, robets, scales, stringr, testthat, tidyverse, tidyquant

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**VignetteBuilder** knitr

**NeedsCompilation** no

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# R topics documented:

## timetk *timetk: a toolkit for time series*

### Description

The `timetk` package combines a collection of coercion tools for time series analysis.

### Details

The `timetk` package has several benefits:

1. Index extraction: get the time series index from any time series object.
2. Understand time series: create a signature and summary from a time series index.
3. Build future time series: create a future time series from an index.
4. Coerce between time-based tibbles (tbl) and the major time series data types xts, zoo, zooreg, and ts: Simplifies coercion and maximizes time-based data retention during coercion to regularized time series (e.g. ts).

To learn more about `timetk`, start with the vignettes: `browseVignettes(package = "timetk")`

## timetk_internal *Internal Functions Used in timetk*

### Description

The following are internal functions that are not meant to be used by users.

### Usage

```
tk_ts_.data.frame(data, select, start, end, frequency, deltat, ts.eps, silent)

tk_ts_.default(data, select, start, end, frequency, deltat, ts.eps, silent)

tk_zooreg_.data.frame(data, select, date_var, start, end, frequency, deltat,
  ts.eps, order.by, silent)

tk_zooreg_.default(data, select, date_var, start, end, frequency, deltat,
  ts.eps, order.by, silent)
```

### Arguments

| | |
|---|---|
| `data` | A time-based tibble or time-series object. |
| `select` | **Applicable to tibbles and data frames only**. The column or set of columns to be coerced to `zooreg` class. |
| `start` | the time of the first observation. Either a single number or a vector of two integers, which specify a natural time unit and a (1-based) number of samples into the time unit. |
| `end` | the time of the last observation, specified in the same way as `start`. |
| `frequency` | the number of observations per unit of time. |
| `deltat` | the fraction of the sampling period between successive observations; e.g., 1/12 for monthly data. Only one of `frequency` or `deltat` should be provided. |
| `ts.eps` | time series comparison tolerance. Frequencies are considered equal if their absolute difference is less than `ts.eps`. |
| `silent` | Used to toggle printing of messages and warnings. |
| `date_var` | **Applicable to tibbles and data frames only**. Column name to be used to `order.by`. `NULL` by default. If `NULL`, function will find the date or date-time column. |
| `order.by` | a vector by which the observations in `x` are ordered. If this is specified the arguments `start` and `end` are ignored and `zoo(data, order.by, frequency)` is called. See `zoo` for more information. |

## tk_augment_timeseries *Augment the time series signature to the data*

### Description

Augment the time series signature to the data

### Usage

```
tk_augment_timeseries_signature(data)
```

### Arguments

| | |
|---|---|
| data | A time-based tibble or time-series object. |

### Details

tk_augment_timeseries_signature adds the time series signature features including numeric value, differences, year, month, day, day of week, day of month, day of year, hour, minute, second to the input data.

### Value

Returns a tibble object describing the timeseries.

### See Also

tk_get_timeseries_signature(), tk_get_timeseries_summary()

### Examples

```
library(tidyquant)
library(timetk)

FANG %>%
    filter(symbol == "FB") %>%
    tk_augment_timeseries_signature()
```

## tk_get_timeseries *Get summary attributes from a time-series index*

### Description

Get summary attributes from a time-series index

### Usage

```
tk_get_timeseries_signature(idx)

tk_get_timeseries_summary(idx)
```

### Arguments

| | |
|---|---|
| idx | A time-series index that is a vector of dates or datetimes. |

### Details

`tk_get_timeseries_signature` decomposes the timeseries into commonly needed features such as numeric value, differences, year, month, day, day of week, day of month, day of year, hour, minute, second.

`tk_get_timeseries_summary` returns the summary returns the start, end, units, scale, and a "summary" of the timeseries differences in seconds including the minimum, 1st quartile, median, mean, 3rd quartile, and maximum frequency. The timeseries differences give the user a better picture of the index frequency so the user can understand the level of regularity or irregularity. A perfectly regular time series will have equal values in seconds for each metric. However, this is not often the case.

**Important Note**: These functions only work with time-based indexes in datetime, date, yearmon, and yearqtr values. Regularized dates cannot be decomposed.

### Value

Returns a `tibble` object describing the timeseries.

### See Also

`tk_index()`, `tk_augment_timeseries_signature()`, `tk_make_future_timeseries()`

### Examples

```
library(tidyquant)
library(timetk)

# Works with time-based tibbles
FB_tbl <- FANG %>% filter(symbol == "FB")
FB_idx <- tk_index(FB_tbl)
```

```
tk_get_timeseries_signature(FB_idx)
tk_get_timeseries_summary(FB_idx)


# Works with dates in any periodicity
idx_weekly <- seq.Date(from = ymd("2016-01-01"), by = 'week', length.out = 6)

tk_get_timeseries_signature(idx_weekly)
tk_get_timeseries_summary(idx_weekly)


# Works with zoo yearmon and yearqtr classes
idx_yearmon <- seq.Date(from       = ymd("2016-01-01"),
                        by         = "month",
                        length.out = 12) %>%
    as.yearmon()

tk_get_timeseries_signature(idx_yearmon)
tk_get_timeseries_summary(idx_yearmon)
```

---

## tk_get_timeseries_unit_frequency

*Get the timeseries unit frequency for the primary time scales*

---

### Description

Get the timeseries unit frequency for the primary time scales

### Usage

```
tk_get_timeseries_unit_frequency()
```

### Value

`tk_get_timeseries_unit_frequency` returns a tibble containing the timeseries frequencies in seconds for the primary time scales including "sec", "min", "hour", "day", "week", "month", "quarter", and "year".

### Examples

```
tk_get_timeseries_unit_frequency()
```

## tk_get_timeseries_variables *Get date or datetime variables (column names)*

### Description

Get date or datetime variables (column names)

### Usage

```
tk_get_timeseries_variables(data)
```

### Arguments

| | |
|---|---|
| data | An object of class data.frame |

### Details

tk_get_timeseries_variables returns the column names of date or datetime variables in a data frame. Classes that meet criteria for return include those that inherit POSIXt, Date, zoo::yearmon, zoo::yearqtr. Function was adapted from padr:::get_date_variables(). See padr helpers.R

### Value

tk_get_timeseries_variables returns a vector containing column names of date-like classes.

### Examples

```
library(tidyquant)
library(timetk)

FANG %>%
    tk_get_timeseries_variables()
```

## tk_index *Extract an index of date or datetime from time series objects, models, forecasts*

### Description

Extract an index of date or datetime from time series objects, models, forecasts

### Usage

```
tk_index(data, timetk_idx = FALSE, silent = FALSE)

has_timetk_idx(data)
```

## Arguments

`data` A time-based tibble, time-series object, time-series model, or `forecast` object.

`timetk_idx` If `timetk_idx` is `TRUE` a timetk time-based index attribute is attempted to be returned. If `FALSE` the default index is returned. See discussion below for further details.

`silent` Used to toggle printing of messages and warnings.

## Details

`tk_index()` is used to extract the date or datetime index from various time series objects, models and forecasts. The method can be used on `tbl`, `xts`, `zoo`, `zooreg`, and `ts` objects. The method can additionally be used on `forecast` objects and a number of objects generated by modeling functions such as `Arima`, `ets`, and `HoltWinters` classes to get the index of the underlying data.

The boolean `timetk_idx` argument is applicable to regularized time series objects such as `ts` and `zooreg` classes that have both a regularized index and *potentially* a "timetk index" (a time-based attribute). When set to `FALSE` the regularized index is returned. When set to `TRUE` the time-based timetk index is returned *if present*.

`has_timetk_idx()` is used to determine if the object has a "timetk index" attribute and can thus benefit from the `tk_index(timetk_idx = TRUE)`. `TRUE` indicates the "timetk index" attribute is present. `FALSE` indicates the "timetk index" attribute is not present. If `FALSE`, the `tk_index()` function will return the default index for the data type.

**Important Note**: To gain the benefit of `timetk_idx` the time series must have a timetk index. Use `has_timetk_idx` to determine if the object has a timetk index. This is particularly important for `ts` objects, which by default do not contain a time-based index and therefore must be coerced from time-based objects such as `tbl`, `xts`, or `zoo` using the `tk_ts()` function in order to get the "timetk index" attribute. Refer to `tk_ts()` for creating persistent date / datetime index during coercion to `ts`.

## Value

Returns a vector of date or date times

## See Also

`tk_ts()`, `tk_tbl()`, `tk_xts()`, `tk_zoo()`, `tk_zooreg()`

## Examples

```
library(tidyverse)
library(timetk)

# Create time-based tibble
data_tbl <- tibble::tibble(
    date = seq.Date(from = as.Date(”2000-01-01”), by = 1, length.out = 5),
    x    = rnorm(5) * 10,
    y    = 5:1
)
tk_index(data_tbl) # Returns time-based index vector
```

```
# Coerce to ts using tk_ts(): Preserves time-basis
data_ts <- tk_ts(data_tbl)
tk_index(data_ts, timetk_idx = FALSE) # Returns regularized index
tk_index(data_ts, timetk_idx = TRUE)  # Returns original time-based index vector

# Coercing back to tbl
tk_tbl(data_ts, timetk_idx = FALSE) # Returns regularized tbl
tk_tbl(data_ts, timetk_idx = TRUE)  # Returns time-based tbl
```

## `tk_make_future_timeseries` *Make a future time series from an existing time series*

### Description

Make a future time series from an existing time series

### Usage

```
tk_make_future_timeseries(idx, n_future, inspect_weekdays = FALSE,
  inspect_months = FALSE, skip_values = NULL, insert_values = NULL)
```

### Arguments

`idx` A vector of dates

`n_future` Number of future observations

`inspect_weekdays` Uses a logistic regression algorithm to inspect whether certain weekdays (e.g. weekends) should be excluded from the future dates. Default is `FALSE`.

`inspect_months` Uses a logistic regression algorithm to inspect whether certain days of months (e.g. last two weeks of year or seasonal days) should be excluded from the future dates. Default is `FALSE`.

`skip_values` A vector of same class as `idx` of timeseries values to skip.

`insert_values` A vector of same class as `idx` of timeseries values to insert.

### Details

`tk_make_future_timeseries` returns a time series based on the input index frequency and attributes.

The argument `n_future` determines how many future index observations to compute.

The `inspect_weekdays` and `inspect_months` arguments apply to "daily" (scale = "day") data (refer to `tk_get_timeseries_summary()` to get the index scale). The `inspect_weekdays` argument is useful in determining missing days of the week that occur on a weekly frequency such as every week, every other week, and so on. It's recommended to have at least 60 days to use this option. The inspect_months argument is useful in determining missing days of the month, quarter or year; however, the algorithm can inadvertently select incorrect dates if the pattern is erratic. For example, some holidays do not occur on the same day of each month, and as a result the incorrect day may be selected in certain years. It's recommended to always review the date results to ensure the future days match the user's expectations. It's recommended to have at least two years of days to use this option.

The skip_values and insert_values arguments can be used to remove and add values into the series of future times. The values must be the same format as the idx class. The skip_values argument useful for passing holidays or special index values that should be excluded from the future time series. The insert_values argument is useful for adding values back that the algorithm may have excluded.

## Value

A vector containing future dates

## See Also

tk_index(), tk_get_timeseries_summary(), tk_get_timeseries_signature()

## Examples

```
library(tidyquant)
library(timetk)

# Basic example
idx <- c("2016-01-01 00:00:00",
         "2016-01-01 00:00:03",
         "2016-01-01 00:00:06") %>%
    ymd_hms()
# Make next three dates in series
idx %>%
    tk_make_future_timeseries(n_future = 3)


# Create index of days that FB stock will be traded in 2017 based on 2016 + holidays
FB_tbl <- FANG %>% filter(symbol == "FB")
holidays <- c("2017-01-02", "2017-01-16", "2017-02-20",
              "2017-04-14", "2017-05-29", "2017-07-04",
              "2017-09-04", "2017-11-23", "2017-12-25") %>%
    ymd()
# Remove holidays with skip_values, and remove weekends with inspect_weekdays = TRUE
FB_tbl %>%
    tk_index() %>%
    tk_make_future_timeseries(n_future         = 366,
                              inspect_weekdays = TRUE,
                              skip_values      = holidays)

# Works with regularized indexes as well
```

```
c(2016.00, 2016.25, 2016.50, 2016.75) %>%
    tk_make_future_timeseries(n_future = 4)

# Works with zoo yearmon and yearqtr too
c("2016 Q1", "2016 Q2", "2016 Q3", "2016 Q4") %>%
    as.yearqtr() %>%
    tk_make_future_timeseries(n_future = 4)
```

## tk_tbl — *Coerce time-series objects to tibble.*

### Description

Coerce time-series objects to tibble.

### Usage

```
tk_tbl(data, preserve_index = TRUE, rename_index = "index",
  timetk_idx = FALSE, silent = FALSE, ...)
```

### Arguments

| | |
|---|---|
| data | A time-series object. |
| preserve_index | Attempts to preserve a time series index. Default is TRUE. |
| rename_index | Enables the index column to be renamed. |
| timetk_idx | Used to return a date / datetime index for regularized objects that contain a timetk "index" attribute. Refer to tk_index() for more information on returning index information from regularized timeseries objects (i.e. ts). |
| silent | Used to toggle printing of messages and warnings. |
| ... | Additional parameters passed to the tibble::as_tibble() function. |

### Details

tk_tbl is designed to coerce time series objects (e.g. xts, zoo, ts, timeSeries, etc) to tibble objects. The main advantage is that the function keeps the date / date-time information from the underlying time-series object.

When preserve_index = TRUE is specified, a new column, index, is created during object coercion, and the function attempts to preserve the date or date-time information. The date / date-time column name can be changed using the rename_index argument.

The timetk_idx argument is applicable when coercing ts objects that were created using tk_ts() from an object that had a time base (e.g. tbl, xts, zoo). Setting timetk_idx = TRUE enables returning the timetk "index" attribute if present, which is the original (non-regularized) time-based index.

## Value

Returns a tibble object.

## See Also

tk_xts(), tk_zoo(), tk_zooreg(), tk_ts()

## Examples

```
library(tidyverse)
library(timetk)

data_tbl <- tibble(
    date = seq.Date(from = as.Date("2010-01-01"), by = 1, length.out = 5),
    x    = seq(100, 120, by = 5)
)


### ts to tibble: Comparison between as.data.frame() and tk_tbl()
data_ts <- tk_ts(data_tbl, start = c(2010,1), freq = 365)

# No index
as.data.frame(data_ts)

# Defualt index returned is regularized numeric index
tk_tbl(data_ts)

# Original date index returned (Only possible if original data has time-based index)
tk_tbl(data_ts, timetk_idx = TRUE)


### xts to tibble: Comparison between as.data.frame() and tk_tbl()
data_xts <- tk_xts(data_tbl)

# Dates are character class stored in row names
as.data.frame(data_xts)

# Dates are appropriate date class and within the data frame
tk_tbl(data_xts)


### zooreg to tibble: Comparison between as.data.frame() and tk_tbl()
data_zooreg <- tk_zooreg(1:8, start = zoo::yearqtr(2000), frequency = 4)

# Dates are character class stored in row names
as.data.frame(data_zooreg)

# Dates are appropriate zoo yearqtr class within the data frame
tk_tbl(data_zooreg)


### zoo to tibble: Comparison between as.data.frame() and tk_tbl()
```

```
data_zoo <- zoo::zoo(1:12, zoo::yearmon(2016 + seq(0, 11)/12))

# Dates are character class stored in row names
as.data.frame(data_zoo)

# Dates are appropriate zoo yearmon class within the data frame
tk_tbl(data_zoo)
```

## tk_ts *Coerce time series objects and tibbles with date/date-time columns to ts.*

### Description

Coerce time series objects and tibbles with date/date-time columns to ts.

### Usage

```
tk_ts(data, select = NULL, start = 1, end = numeric(), frequency = 1,
  deltat = 1, ts.eps = getOption("ts.eps"), silent = FALSE)

tk_ts_(data, select = NULL, start = 1, end = numeric(), frequency = 1,
  deltat = 1, ts.eps = getOption("ts.eps"), silent = FALSE)
```

### Arguments

`data` A time-based tibble or time-series object.

`select` **Applicable to tibbles and data frames only**. The column or set of columns to be coerced to `ts` class.

`start` the time of the first observation. Either a single number or a vector of two integers, which specify a natural time unit and a (1-based) number of samples into the time unit. See the examples for the use of the second form.

`end` the time of the last observation, specified in the same way as `start`.

`frequency` the number of observations per unit of time.

`deltat` the fraction of the sampling period between successive observations; e.g., 1/12 for monthly data. Only one of `frequency` or `deltat` should be provided.

`ts.eps` time series comparison tolerance. Frequencies are considered equal if their absolute difference is less than `ts.eps`.

`silent` Used to toggle printing of messages and warnings.

## Details

tk_ts() is a wrapper for stats::ts() that is designed to coerce tibble objects that have a "time-base" (meaning the values vary with time) to ts class objects. There are two main advantages:

1. Non-numeric columns get removed instead of being populated by NA's.
2. The returned ts object retains a "timetk index" (and various other attributes) if detected. The "timetk index" can be used to coerce between tbl, xts, zoo, and ts data types.

The select argument is used to select subsets of columns from the incoming data.frame. Only columns containing numeric data are coerced. *At a minimum, a* frequency *and a* start *should be specified.*

For non-data.frame object classes (e.g. xts, zoo, timeSeries, etc) the objects are coerced using stats::ts().

tk_ts_ is a nonstandard evaluation method.

## Value

Returns a ts object.

## See Also

tk_index(), tk_tbl(), tk_xts(), tk_zoo(), tk_zooreg()

## Examples

```
library(tidyverse)
library(timetk)

### tibble to ts: Comparison between tk_ts() and stats::ts()
data_tbl <- tibble::tibble(
    date = seq.Date(as.Date("2016-01-01"), by = 1, length.out = 5),
    x    = rep("chr values", 5),
    y    = cumsum(1:5),
    z    = cumsum(11:15) * rnorm(1))

# as.ts: Character columns introduce NA's; Result does not retain index
stats::ts(data_tbl[,-1], start = 2016)

# tk_ts: Only numeric columns get coerced; Result retains index in numeric format
data_ts <- tk_ts(data_tbl, start = 2016)
data_ts

# timetk index
tk_index(data_ts, timetk_idx = FALSE)   # Regularized index returned
tk_index(data_ts, timetk_idx = TRUE)    # Original date index returned

# Coerce back to tibble
data_ts %>% tk_tbl(timetk_idx = TRUE)
```

```
### Using select
tk_ts(data_tbl, select = y)


### NSE: Enables programming
select   <- "y"
tk_ts_(data_tbl, select = select)
```

## tk_xts — *Coerce time series objects and tibbles with date/date-time columns to xts.*

### Description

Coerce time series objects and tibbles with date/date-time columns to xts.

### Usage

```
tk_xts(data, select = NULL, date_var = NULL, silent = FALSE, ...)

tk_xts_(data, select = NULL, date_var = NULL, silent = FALSE, ...)
```

### Arguments

`data` A time-based tibble or time-series object.

`select` **Applicable to tibbles and data frames only**. The column or set of columns to be coerced to `ts` class.

`date_var` **Applicable to tibbles and data frames only**. Column name to be used to `order.by`. `NULL` by default. If `NULL`, function will find the date or date-time column.

`silent` Used to toggle printing of messages and warnings.

`...` Additional parameters to be passed to `xts::xts()`. Refer to `xts::xts()`.

### Details

`tk_xts` is a wrapper for `xts::xts()` that is designed to coerce `tibble` objects that have a "time-base" (meaning the values vary with time) to `xts` class objects. There are three main advantages:

1. Non-numeric columns that are not removed via `select` are dropped and the user is warned. This prevents an error or coercion issue from occurring.
2. The date column is auto-detected if not specified by `date_var`. This takes the effort off the user to assign a date vector during coercion.
3. `ts` objects are automatically coerced if a "timetk index" is present. Refer to `tk_ts()`.

The select argument can be used to select subsets of columns from the incoming data.frame. Only columns containing numeric data are coerced. The date_var can be used to specify the column with the date index. If date_var = NULL, the date / date-time column is interpreted. Optionally, the order.by argument from the underlying xts::xts() function can be used. The user must pass a vector of dates or date-times if order.by is used.

For non-data.frame object classes (e.g. xts, zoo, timeSeries, etc) the objects are coerced using xts::xts().

tk_xts_ is a nonstandard evaluation method.

## Value

Returns a xts object.

## See Also

tk_tbl(), tk_zoo(), tk_zooreg(), tk_ts()

## Examples

```
library(tidyverse)
library(timetk)

### tibble to xts: Comparison between tk_xts() and xts::xts()
data_tbl <- tibble::tibble(
    date = seq.Date(as.Date("2016-01-01"), by = 1, length.out = 5),
    x    = rep("chr values", 5),
    y    = cumsum(1:5),
    z    = cumsum(11:15) * rnorm(1))

# xts: Character columns cause coercion issues; order.by must be passed a vector of dates
xts::xts(data_tbl[,-1], order.by = data_tbl$date)

# tk_xts: Non-numeric columns automatically dropped; No need to specify date column
tk_xts(data_tbl)

# ts can be coerced back to xts
data_tbl %>%
    tk_ts(start = 2016, freq = 365) %>%
    tk_xts()

### Using select and date_var
tk_xts(data_tbl, select = y, date_var = date)


### NSE: Enables programming
date_var <- "date"
select   <- "y"
tk_xts_(data_tbl, select = select, date_var = date_var)
```

## tk_zoo — *Coerce time series objects and tibbles with date/date-time columns to xts.*

### Description

Coerce time series objects and tibbles with date/date-time columns to xts.

### Usage

```
tk_zoo(data, select = NULL, date_var = NULL, silent = FALSE, ...)

tk_zoo_(data, select = NULL, date_var = NULL, silent = FALSE, ...)
```

### Arguments

| | |
|---|---|
| `data` | A time-based tibble or time-series object. |
| `select` | **Applicable to tibbles and data frames only**. The column or set of columns to be coerced to `ts` class. |
| `date_var` | **Applicable to tibbles and data frames only**. Column name to be used to `order.by`. `NULL` by default. If `NULL`, function will find the date or date-time column. |
| `silent` | Used to toggle printing of messages and warnings. |
| `...` | Additional parameters to be passed to `xts::xts()`. Refer to `xts::xts()`. |

### Details

`tk_zoo` is a wrapper for `zoo::zoo()` that is designed to coerce `tibble` objects that have a "time-base" (meaning the values vary with time) to `zoo` class objects. There are three main advantages:

1. Non-numeric columns that are not removed via `select` are dropped and the user is warned. This prevents an error or coercion issue from occurring.
2. The date column is auto-detected if not specified by `date_var`. This takes the effort off the user to assign a date vector during coercion.
3. `ts` objects are automatically coerced if a "timetk index" is present. Refer to `tk_ts()`.

The `select` argument can be used to select subsets of columns from the incoming data.frame. Only columns containing numeric data are coerced. The `date_var` can be used to specify the column with the date index. If `date_var = NULL`, the date / date-time column is interpreted. Optionally, the `order.by` argument from the underlying `zoo::zoo()` function can be used. The user must pass a vector of dates or date-times if `order.by` is used. *Important Note: The `...` arguments are passed to `xts::xts()`, which enables additional information (e.g. time zone) to be an attribute of the `zoo` object.*

For non-data.frame object classes (e.g. `xts`, `zoo`, `timeSeries`, etc) the objects are coerced using `zoo::zoo()`.

`tk_zoo_` is a nonstandard evaluation method.

## Value

Returns a zoo object.

## See Also

tk_tbl(), tk_xts(), tk_zooreg(), tk_ts()

## Examples

```
library(tidyverse)
library(timetk)

### tibble to zoo: Comparison between tk_zoo() and zoo::zoo()
data_tbl <- tibble::tibble(
    date = seq.Date(as.Date("2016-01-01"), by = 1, length.out = 5),
    x    = rep("chr values", 5),
    y    = cumsum(1:5),
    z    = cumsum(11:15) * rnorm(1))

# zoo: Characters will cause error; order.by must be passed a vector of dates
zoo::zoo(data_tbl[,-c(1,2)], order.by = data_tbl$date)

# tk_zoo: Character columns dropped with a warning; No need to specify dates (auto detected)
tk_zoo(data_tbl)

# ts can be coerced back to zoo
data_tbl %>%
    tk_ts(start = 2016, freq = 365) %>%
    tk_zoo()


### Using select and date_var
tk_zoo(data_tbl, select = y, date_var = date)


### NSE: Enables programming
date_var <- "date"
select   <- "y"
tk_zoo_(data_tbl, select = select, date_var = date_var)
```

---

# tk_zooreg *Coerce time series objects and tibbles with date/date-time columns to ts.*

---

## Description

Coerce time series objects and tibbles with date/date-time columns to ts.

## Usage

```
tk_zooreg(data, select = NULL, date_var = NULL, start = 1,
  end = numeric(), frequency = 1, deltat = 1,
  ts.eps = getOption("ts.eps"), order.by = NULL, silent = FALSE)

tk_zooreg_(data, select = NULL, date_var = NULL, start = 1,
  end = numeric(), frequency = 1, deltat = 1,
  ts.eps = getOption("ts.eps"), order.by = NULL, silent = FALSE)
```

## Arguments

`data` A time-based tibble or time-series object.

`select` **Applicable to tibbles and data frames only**. The column or set of columns to be coerced to `zooreg` class.

`date_var` **Applicable to tibbles and data frames only**. Column name to be used to `order.by`. `NULL` by default. If `NULL`, function will find the date or date-time column.

`start` the time of the first observation. Either a single number or a vector of two integers, which specify a natural time unit and a (1-based) number of samples into the time unit.

`end` the time of the last observation, specified in the same way as `start`.

`frequency` the number of observations per unit of time.

`deltat` the fraction of the sampling period between successive observations; e.g., 1/12 for monthly data. Only one of `frequency` or `deltat` should be provided.

`ts.eps` time series comparison tolerance. Frequencies are considered equal if their absolute difference is less than `ts.eps`.

`order.by` a vector by which the observations in `x` are ordered. If this is specified the arguments `start` and `end` are ignored and `zoo(data, order.by, frequency)` is called. See `zoo` for more information.

`silent` Used to toggle printing of messages and warnings.

## Details

`tk_zooreg()` is a wrapper for `zoo::zooreg()` that is designed to coerce `tibble` objects that have a "time-base" (meaning the values vary with time) to `zooreg` class objects. There are two main advantages:

1. Non-numeric columns get removed instead causing coercion issues.
2. If an index is present, the returned `zooreg` object retains an index retrievable using `tk_index()`.

The `select` argument is used to select subsets of columns from the incoming data.frame. The `date_var` can be used to specify the column with the date index. If `date_var = NULL`, the date / date-time column is interpreted. Optionally, the `order.by` argument from the underlying `xts::xts()` function can be used. The user must pass a vector of dates or date-times if `order.by` is used. Only columns containing numeric data are coerced. *At a minimum, a* `frequency` *and a* `start` *should be specified.*

For non-data.frame object classes (e.g. xts, zoo, timeSeries, etc) the objects are coerced using zoo::zooreg().

tk_zooreg_ is a nonstandard evaluation method.

## Value

Returns a zooreg object.

## See Also

tk_tbl(), tk_xts(), tk_zoo(), tk_ts()

## Examples

```
### tibble to zooreg: Comparison between tk_zooreg() and zoo::zooreg()
data_tbl <- tibble::tibble(
    date = seq.Date(as.Date("2016-01-01"), by = 1, length.out = 5),
    x    = rep("chr values", 5),
    y    = cumsum(1:5),
    z    = cumsum(11:15) * rnorm(1))

# zoo::zooreg: Values coerced to character; Result does not retain index
data_zooreg <- zoo::zooreg(data_tbl[,-1], start = 2016, freq = 365)
data_zooreg                # Numeric values coerced to character
rownames(data_zooreg)      # NULL, no dates retained

# tk_zooreg: Only numeric columns get coerced; Result retains index as rownames
data_tk_zooreg <- tk_zooreg(data_tbl, start = 2016, freq = 365)
data_tk_zooreg             # No inadvertent coercion to character class

# timetk index
tk_index(data_tk_zooreg, timetk_idx = FALSE)   # Regularized index returned
tk_index(data_tk_zooreg, timetk_idx = TRUE)    # Original date index returned

### Using select and date_var
tk_zooreg(data_tbl, select = y, date_var = date, start = 2016, freq = 365)


### NSE: Enables programming
select   <- "y"
date_var <- "date"
tk_zooreg_(data_tbl, select = select, date_var = date_var, start = 2016, freq = 365)
```

# Index