

# Package ‘fsu’

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**Type** Package

**Title** Methods developed by the FSU

**Version** 0.1.0

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**Description**

Featuring forecasting methods developed by the Forecasting & Strategy Unit (NTUA).

**License** GPL ( $i=2$ )

**Encoding** UTF-8

**LazyData** yes

**Depends** forecast

**URL** <http://fsu.gr>

**NeedsCompilation** no

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**fsu-package**

*Forecasting Functions for Time Series*

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## Description

Featuring methods and tools developed by the Forecasting & Strategy Unit (National Technical University of Athens)

<https://fsu.gr>.

**Details**

Package: fsu  
 Type: Package  
 LazyLoad: yes

**Author(s)**

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**four.theta***Forecasts using the 4Theta method*

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**Description**

Returns forecasts and other information for the 4Theta method's forecasts applied to x.

**Usage**

```
four.theta(x, fh)
```

**Arguments**

<b>x</b>	a numeric vector or time series
<b>fh</b>	number of periods for forecasting

**Details**

Based on Assimakopoulos, V. and Nikolopoulos, K. (2000), Spiliotis, E. examined modifications on the decomposition framework of Theta to boost its performance. This includes considering non-linear patterns of trend, adjusting trend intensity and introducing a multiplicative expression of the method. The extensions proposed transform Theta into a generalized forecasting algorithm for automatic extrapolation with enhanced flexibility and improved properties compared to its classical form.

**Value**

<b>mean</b>	point forecasts as a time series
<b>fitted</b>	fitted values
<b>description</b>	...

**See Also**

theta.classic, theta.BoxCox.

**Examples**

```
ts<-rnorm(100, mean=50, sd=10)
four.theta(ts,10)$mean
```

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mase.cal	Error measure
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**Description**

Returns the Mean Absolute Scaled Error

**Usage**

```
mase.cal(insample, outsample, forecasts)
```

**Arguments**

insample	a numeric vector or time series of actual values used to produce forecasts
outsample	a numeric vector or time series of actual values
forecasts	a numeric vector or time series of forecasts

**Value**

mase error for each forecast point

**References**

Hyndman R.J., Koehler A.B. (2006). *Another look at measures of forecast accuracy*. International Journal of Forecasting, 22, pp.679-688.

**See Also**

smape.cal, theta.classic.

**Examples**

```
mase.cal(c(1:10),c(10,10),c(11,12))
```

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naive.seasonal	Forecasts using the seasonal naive method
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**Description**

Returns forecasts for the seasonal naive method's forecasts applied to x.

**Usage**

```
naive.seasonal(x, fh)
```

**Arguments**

x	a numeric vector or time series
fh	number of periods for forecasting

**Value**

point forecasts as a time series

**See Also**

`theta.classic`, `four.theta`.

**Examples**

```
ts<-rnorm(100, mean=50, sd=10)
naive.seasonal(ts,10)
```

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<code>seasonality.test</code>	<i>Seasonality test of time series</i>
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**Description**

Determines whether or not a time series is seasonal

**Usage**

```
seasonality.test(x,ppy)
```

**Arguments**

<code>x</code>	a numeric vector or time series
<code>ppy</code>	...

**Value**

logical vector

**See Also**

`four.theta`, `theta.classic`.

**Examples**

```
ts<-rnorm(100, mean=50, sd=10)
seasonality.test(ts,1)
```

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smape.cal	<i>Error measure</i>
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**Description**

Returns the Symmetric Mean Absolute Percentage Error

**Usage**

```
smape.cal(outsample, forecasts)
```

**Arguments**

outsample	a numeric vector or time series of actual values
forecasts	a numeric vector or time series of forecasts

**Value**

smape error for each forecast point

**See Also**

```
mase.cal, theta.classic.
```

**Examples**

```
smape.cal(c(10,10),c(11,12))
```

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theta.BoxCox	<i>Forecasts using the BoxCox Theta method</i>
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**Description**

Returns forecasts for a transformation of the Theta method's forecasts applied to x.

**Usage**

```
theta.BoxCox(x, fh)
```

**Arguments**

x	a numeric vector or time series
fh	number of periods for forecasting

**Details**

Based on Assimakopoulos, V. and Nikolopoulos, K. (2000), Legaki, N.Z. and Koutsouri, A. developed a framework to boost Theta's performance. This includes deseasonalizing the data, applying Box-Cox Transformation, generating forecast based on the Theta method, applying Reverse Box-Cox Transformation and Re-seasonalizing the data.

**Value**

mean                      point forecasts as a time series

**See Also**

theta.classic, four.theta.

**Examples**

```
ts<-rnorm(100, mean=50, sd=10)
theta.BoxCox(ts,10)$mean
```

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theta.classic	<i>Forecasts using the Theta method</i>
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**Description**

Returns forecasts and other information for the Theta method's forecasts applied to x.

**Usage**

```
theta.classic(x, fh)
```

**Arguments**

x                      a numeric vector or time series  
 fh                    number of periods for forecasting

**Value**

mean                      point forecasts as a time series  
 fitted                    fitted values  
 mean0                    point forecasts of the zero Theta line  
 fitted0                   fitted values of the zero Theta line  
 mean2                    point forecasts of the other Theta line  
 fitted2                   fitted values of the other Theta line

**References**

Assimakopoulos, V. and Nikolopoulos, K. (2000) *The theta model: a decomposition approach to forecasting*. International Journal of Forecasting 16, 521–530.

**See Also**

four.theta, theta.BoxCox.

**Examples**

```
ts<-rnorm(100, mean=50, sd=10)
theta.classic(ts,10)$mean
```