

# Package: fasster (via r-universe)

November 1, 2024

**Version** 0.1.0.9100

**Title** Fast Additive Switching of Seasonality, Trend and Exogenous Regressors

**Description** Implementation of the FASSTER model for forecasting time series with multiple seasonalities using switching states.

**Depends** R (>= 3.2.0), fabletools (>= 0.2.0)

**Imports** dlm, tsibble (>= 0.9.0), purrr, rlang, stats, dplyr (>= 1.0.0), distributional, vctrs

**Suggests** tsibbledata (>= 0.2.0), lubridate, rwalkr, knitr, rmarkdown, testthat, spelling, covr, ggplot2

**Remotes** tidyverts/fabletools

**URL** <https://github.com/mitchelloharawild/fasster>

**BugReports** <https://github.com/mitchelloharawild/fasster/issues>

**License** GPL-3

**Encoding** UTF-8

**LazyData** true

**ByteCompile** true

**RoxygenNote** 7.1.1

**Roxygen** list(markdown = TRUE, roclets=c('rd', 'collate', 'namespace'))

**Language** en-GB

**VignetteBuilder** knitr

**Repository** <https://robjhyndman.r-universe.dev>

**RemoteUrl** <https://github.com/mitchelloharawild/fasster>

**RemoteRef** HEAD

**RemoteSha** f5eb54a59ba02780c6f6ba237376b896883d15ce

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### Description

Implementation of the FASSTER model for forecasting time series with multiple seasonalities using switching states.

### Details

Package:	fasster
Type:	Package
License:	GPL3
LazyLoad:	yes

### Author(s)

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FASSTER	<i>Fast Additive Switching of Seasonality, Trend and Exogenous Regressors</i>
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### Description

Implements FASSTER

### Usage

```
FASSTER(formula, include = NULL, ...)
```

**Arguments**

formula	An object of class "formula" (refer to 'Formula' for usage)
include	How many terms should be included to fit the model
...	Not used

**Details**

The fasster model extends commonly used state space models by introducing a switching component to the measurement equation. This is implemented using a time-varying DLM with the switching behaviour encoded in the measurement matrix.

**Value**

Returns a mable containing the fitted FASSTER model.

**Formula**

fasster inherits the standard formula specification from `lm` for specifying exogenous regressors, including interactions and `I()` functionality as described in [formula](#).

Special DLM components can be specified using special functions defined below:

- `seas(s)`: Creates seasonal factors with seasonal period `s`
- `fourier(s, K)`: Creates seasonal fourier terms with seasonal period `s` and `K` harmonics
- `poly(n)`: Creates a polynomial of order `n` (`poly(1)` creates a level, `poly(2)` creates a trend)
- `ARMA(ar, ma)`: Creates ARMA terms with coefficient vectors `ar` and `ma`
- `custom(dlm)`: Creates a custom dlm structure, using [dlm](#)

The switching operator, `%S%` requires the switching factor variable on the LHS, and the model to switch over on the RHS (as built using the above components)

**Heuristic**

The model parameters are estimated using the following heuristic:

1. Filter the data using the specified model with non-zero state variances
2. Obtain smoothed states  $(\theta^{(s)}_t = \theta_t | D_T)$  to approximate correct behaviour
3. The initial state parameters taken from the first smoothed state:  $m_0 = E(\theta_0^{(s)})$ ,  $C_0 = Var(\theta_0^{(s)})$
4. Obtain state noise variances from the smoothed variance of  $w_t$ :  $W = Var(w_t^{(s)}) = Var(\theta_t^{(s)} - G\theta_{t-1}^{(s)})$  Obtain measurement noise variance from smoothed variance of  $v_t$ :  $V = Var(v_t^{(s)}) = Var(y_t - F_t\theta_t^{(s)})$
5. Repair restricted state variances for seasonal factors and ARMA terms

## Examples

```
cbind(mdeaths, fdeaths) %>%  
  as_tsibble(pivot_longer = FALSE) %>%  
  model(FASSTER(mdeaths ~ fdeaths + trend(1) + fourier(12)))
```

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tidy.FASSTER

*Extract coefficients from a FASSTER model*

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## Description

Obtains the mean and variance of the estimated initial states from a FASSTER model. Values in the `estimate` column are the mean, and the `std.error` column contains the standard deviation of the initial states.

## Usage

```
## S3 method for class 'FASSTER'  
tidy(x, ...)
```

## Arguments

`x` An object containing a FASSTER model.  
`...` Unused.

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