

## Accompanying letter for the submitted article

### ***The smoots Package in R for Semiparametric Modeling of Trend Stationary Time Series***

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Dear Sir or Madam,

With this submission, we introduce version 1.0.1 of the `smoots` (smoothing time series) package that is already available on the Comprehensive R Archive Network (CRAN).

When analyzing time series in different areas of study, the constancy of quantities like the mean, the variance and the covariances is often assumed in order to fit parametric models to the data at hand. Nevertheless, these are strong assumptions that are usually violated in reality, since time series frequently admit a trend and therefore a time-varying mean. While different parametric and nonparametric approaches have been developed to identify trend functions, each method introduces a number of specific strengths and weaknesses.

The core of the `smoots` package is an implemented local polynomial estimator for the identification of deterministic trend functions in trend-stationary time series. Notwithstanding that similar estimators are of course already built into R packages like `stats`, `KernSmooth` and `locpol`, within the `smoots` package, a novelty can be found that addresses a major flaw of local polynomial regression: the bandwidth selection. All packages existing prior to `smoots` require the user to select an arbitrary bandwidth, which strongly influences the fitted trend. Applying the functions of the `smoots` package, users are enabled to estimate trends via local polynomial regression with a bandwidth automatically selected by a specifically developed, purely data-driven algorithm. Furthermore, also the first and second derivatives of a trend can be estimated without the need to select a bandwidth manually, which strongly facilitates the analysis of growth rates and curvatures of trends of given time series. The newly introduced bandwidth algorithm in `smoots` therefore allows inexperienced users, who do not have profound knowledge with regard to trend estimation in time series analysis and more specifically local polynomial regression, to obtain automatically generated, suitable trend estimates with only the observations being obligatorily needed as an input.

Moreover, the utility of R in the area of time series analysis is notably increased under consideration of `smoots`, as the output of the package's functions can be easily combined with already existing R functions, which allows for simple, data-driven fitting approaches for a variety of semiparametric models.

We hope that the package `smoots` catches your interest. Furthermore, we kindly thank you in advance for considering our submission as a possible addition to the R Journal.

Yours faithfully and on behalf of all co-authors



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