

An R Package for Robust Time Series Analysis

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This work presents a new R package for the robust estimation and inference for time series models. The package is called “**gmwm**” and is based on the findings of ? who use a wavelet decomposition of the time series to obtain parameter estimates using the idea of the Generalized Method of Wavelet Moments (GMWM). Taking from these results, ? developed a robust version of this methodology which allows to make available a flexible and broad tool for robust time series inference.

The **gmwm** package makes use of the Wavelet Variance (WV) which is the variance of the wavelet coefficients issued from a wavelet decomposition. This WV is estimated robustly by adapting Huber’s Proposal 2 to the stationary time series setting and allows the user to specify the desired level of efficiency compared to the standard estimator of WV. Using this quantity, the package makes available some flexible plotting tools to compare the standard and robust WV and understand if a robust inference procedure is necessary.

Once the WV analysis is carried out and a robust estimation appears to be necessary, the package provides a function which allows to robustly estimate the parameters of a wide range of Gaussian time series, going from ARMA to many (additive) State-Space models. Moreover, the package provides further plotting tools to verify whether the estimated model fits the time series well in addition to functions to carry out robust inference and model selection.

The **gmwm** package therefore represents the only available platform to date which implements a general framework for robust inference for a broad class of time series models.

References

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