

# Quick Guide to the stationarity' Package

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- [Stationary Test](#)

This vignette serves as a quick guide on how to use the 'stationarity' R package to perform stationarity test based on multitaper method. The reference to this package is [here](#)

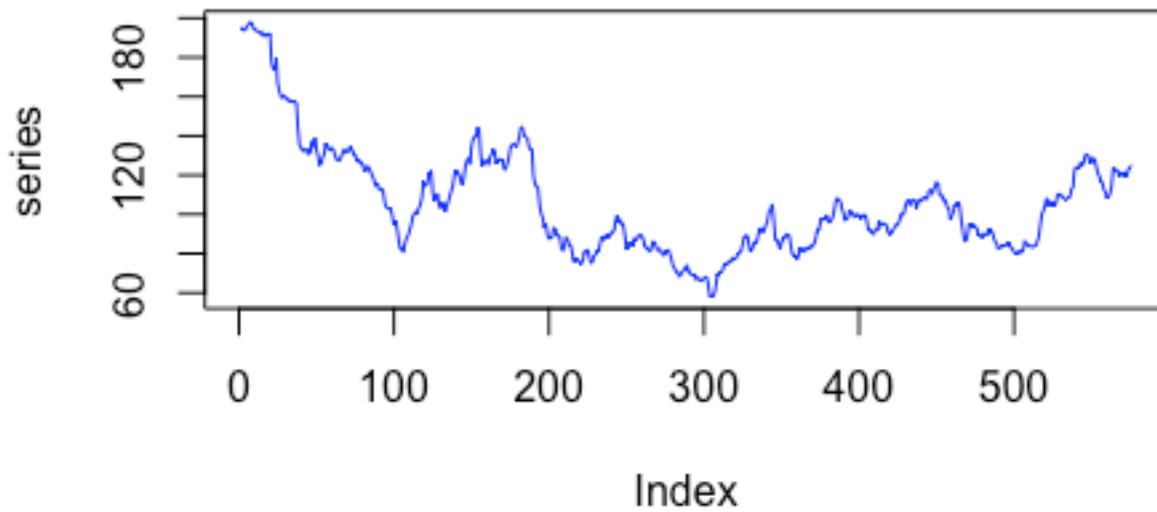
## Stationary Test

Suppose that we are interested in testing whether a given time series is stationary, with the null hypothesis that the series is stationary. The following function returns a boolean result, where 'False' indicates a rejection of the null hypothesis (under a default 0.05 significance level).

The R package includes 'ppp' dataset. It is an R dataframe containing exchange rates of Canada, China, Germany, Japan, and UK, with respect to US over the period of January 1970 to December 2017. As elaborated in the reference paper, the data could be used for understanding purchasing power parity (PPP) hypothesis

```
library(stationarity)
# Load exchange rates data
data(ppp)
series <- ppp$japan
# Visualize the series
plot(series, type="l", col="blue")
title(main="Exchange rates of Japan", col.main="black", font.main=4)
```

## Exchange rates of Japan

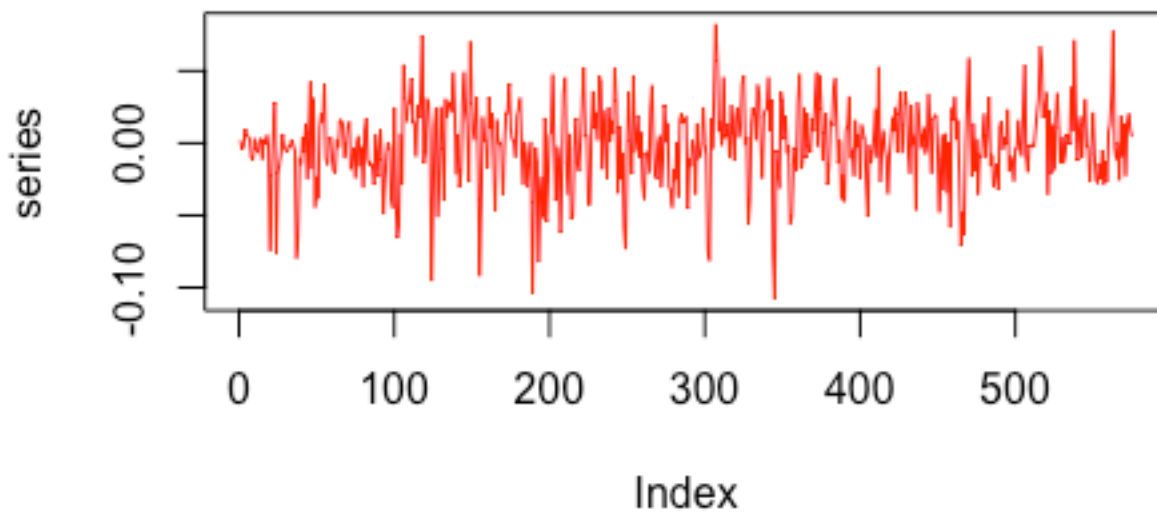


```
# Perform test, with the null hypothesis being stationary
isStationary <- stationarityTest(series)
# isStationary=FALSE indicates a rejection of the null hypothesis that the series is stationary
print(isStationary)
```

```
## [1] FALSE
```

```
# Suppose we difference the log of the original data
series <- diff(log(ppp$japan))
plot(series, type="l", col="red")
title(main="Exchange rates of Japan", col.main="black", font.main=4)
```

## Exchange rates of Japan



```
isStationary <- stationarityTest(series)
# isStationary=True indicates a failure of rejection of the null hypothesis that the series is
stationary
print(isStationary)
```

```
## [1] TRUE
```

In the above uses, the default significance level is set to be 0.05, and the default method is ‘parametric’ which corresponds to the modified Priestley and Subba Rao (PSR) test in the reference paper. The ‘parametric’ method is based on an amalgamation of multitaper method and two-way ANOVA test.

Alternatively, user may change the default arguments, e.g. with the following codes. The method ‘nonparametric’ is based on an amalgamation of multitaper method and a rank-based nonparametric test that was also elaborated in the reference paper. The significance level  $\alpha$  controls the Type I error.

```
isStationary <- stationarityTest(series, alpha=0.01, method='nonparametric')
```