Cross-validation with a test data set considering only the last 35 of the 100 observations (see figure~\ref{fig:diff2\_testset} above) confirms furthermore the non-stationary character of the twice-differenced-model

Box.test(d2.indiceloyers.test, lag=2, type="Ljung-Box") p-value of 0.033 suggests the data are (time-)independent

adf.test(d2.indiceloyers.test, alternative = "stationary", k=2) H0 of non-stationarity cannot be rejected which is not a problem, that could be due to lack of observations

kpss.test(d2.indiceloyers.test) with a p-value>0.05 the test data seems to be stationary aswell

the data of the first period (1993 to 2009) twice-differenced series show independent observations as well (see figure~\ref{fig:diff2\_test\_train}), however we can see a slightly slower increase in the segment from 2009 to 2018 indicating that in the years from 1993 to 2009 the growth in rental prices was higher than in the years in the second's segment which begins from 2009. that can be explained by the big baisse in the early 90ies, starting from a lower initial point and better conjunctural perspectives the increase was stronger, whilst from 2009 on the growth in rental prices slowed down, which can be very well explained by the US subprime crises beginning in the year 2008 followed by a long-taking global recession.

\begin{figure}[!htb]

\centering

**\includegraphics**[angle=0,

width=0.8\textwidth]{diff2\_test\_train}

\caption{mean-centered twice-differenced series, periods from 1993 to 2009 and 2009 to 2018

**\label{fig:diff2\_test\_train}**}

\end{figure}