

This thesis focuses on option of omitting the stationarity assumption, which is usually used in the financial time series analysis. The theory of semi-stationary processes is introduced. This type of process has time-dependent spectra (the evolutionary spectra) in comparison with stationary process. The evolutionary spectra estimator is derived using a linear filter and then averaged in time to reduce any fluctuations caused by randomness. Predictions and variance estimates are retrieved from the estimated time dependent spectra. The semi-stationary processes theory is applied to the ARMA processes with time-dependent coefficients, a coefficient estimator based on evolutionary spectra is suggested. Calculations are performed in R software.