



Extracting Air Quality Indicator Trends Using Time Series Butterworth Filters

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Abstract

Air quality control is a fundamental issue, given the possible effects of exposure to air pollution on human health. Understanding the temporal variation mechanism of the aerosol and gaseous pollutants is therefore an important question. The approach we follow starts with the estimation of a latent common factor that we consider a pollution indicator from which we extract its trend component. The data set for the empirical analysis is made up of weekly time series observations covering a period of twelve years and recorded at four different monitoring sites in an Alpine Italian province. In particular, the main aim is the proposal of a procedure that can be used to extract a meaningful latent dynamic stochastic process supposed to represent the generating process of air pollution for each site and to apply a model-based low pass Butterworth filter, used to isolate the low frequency component in a series. The overall main aim is to assess whether any improvement in the pollution level has been observed during the period of observation. The results show that some improvement in the level of air pollution has been achieved even if there are evident differences among the monitoring sites.

Keywords: air quality, dynamic-factor model, unobserved component model, Butterworth filter.