Discussion of "Should we sample a time series more frequently? Decision support via multirate spectrum estimation" by Nason, Powell, Elliott and Smith

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The authors should be commended on an interesting paper exploring an area that is often overlooked.

The authors have applied their techniques to CPI and International passenger data available from the ONS. An interesting extension of their work would be to consider a series such as GDP that is made up from several underlying series potentially collected at different sampling rates. Under this example one may wish to consider increasing the sampling rate of one or more of the underlying series and the effects this would have on the estimation of GDP. This is a specific example of a multivariate extension to their work where not all components have the same existing sampling rate and not all may benefit from moving to an increased sampling rate. Could the authors comment on whether their methodology could be generalized to this scenario and the potential challenges which might be encountered?

Underlying the authors decision rule is spectral estimation. The authors have described an approach for spectral estimation from multirate data but have considered all of this in the stationary context. It is widely acknowledged within ONS that many of the time series they encounter have seasonal breaks or evolving seasonal structures and hence piecewise constant or evolving spectra. The estimation of the evolving multirate spectra is one challenge and the extension of the decision rule to nonstationary spectra is a second.

For estimating the spectrum, Nettheim (1965) suggests a number of methods to account for evolving seasonality. The chief contribution being a time varying Fourier spectrum estimated across a number of moving windows. These, or more recent locally stationary Fourier (Dahlhaus, 1997), basis functions could be used in place of the time-invariant functions in the paper. Could the authors comment on the potential impact of using such a process on the overall variance of the forecasts, and similarly the effect of using the stationary assumption when in the presence of evolving seasonality.

Finally, the results surrounding the decision rule appear to hinge on the fact that the new information reduces the variance of the estimated coefficients (equation 12). In the evolving spectra scenario this description is no longer valid as the new information does not give you more information about what you have already seen. Could the authors comment on whether they envisage that a decision rule taking into account evolving information would be achievable.

References

Dahlhaus, R. (1997). Fitting time series models to nonstationary processes. *The Annals of Statistics*, 25(1):1–37.

Nettheim, N. F. (1965). Fourier methods for evolving seasonal patterns. *Journal of the American Statistical Association*, 60(310):492–502.