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Book review

Rob J. Hyndman, Anne B. Koehler, J. Keith Ord, Ralph Snyder. Forecasting with Exponential Smoothing: The State Space Approach. Springer (2008). 359 pp, ISBN 978-3-540-71916-0 (paperback), € 36.95, e-ISBN 978-3-540-71918-2 (online), € 25/Chapter

'Exponential smoothing' (ES) may have a ring of an old and very simple *ad hoc* technique for extrapolation. However, the subtitle, "The state space approach", and the names of the authors, all well known as prominent researchers in forecasting, should change your mind.

There are many reasons why a book-length treatment of ES is warranted. First, when modeling human behaviour as it shapes economic time series, ES is frequently the first choice. Also, the univariate IMA(1, 1) is the simplest equilibrium correction model. Model-based seasonal adjustment almost always picks an ARIMA $(0, 1, 1) \times (0, 1, 1)_s$ specification, which again is close to the formerly widely used X11 filter, and similar to the Holt-Winters' variation of ES. When it became popular to insert expectations into econometric models, adaptive expectations, i.e. ES, was a popular choice (see Lucas & Rapping, 1970). In forecasting, ES is method number 1, and it has also fared well in the M competitions. And yes, simple ES is only an IMA(1, 1), but as such it could be estimated by MLE, so there goes the "ad hoc". It is therefore about time that we had a comprehensive textbook on the method. The state space (SS) representation makes the text intuitive and the methods adaptable when building models. Add to that high mathematical standards, and you have an excellent book that takes you on a great journey through various ES methods.

The first four chapters introduce the different ES combinations, divided into additive and multiplicative models. You may think that it would have been sufficient to discuss the additive version only, because, at least in economic applications, the logarithmic transformation is a common choice, but in fact it is not introduced until p. 256. The handbook style of the first two parts makes quite heavy reading; a few examples might have lightened up the text. The first example does not appear until p. 70. Still, these chapters are very useful when doing applied work and programming. The reader comes to realise that the authors have done all of the heavy work themselves. They provide R code for most of their examples at www.exponentialsmoothing.net.

Having introduced the main models, the authors describe how to specify, estimate and check them, and finally how to produce model forecasts. The following chapters are a worthy continuation and updating of the 20-year-old classic work by Harvey (1989) on SS modeling. An elegant way of performing seasonal adjustments using the SS approach is highlighted, including the way in which to normalize the seasonal component in order to preserve the additive structure. The new subject of normalized multivariate seasonal adjustment is introduced in the chapter on Vector-SS. The quality of the SS models is assessed in large and varied sets of time series, which demonstrate their usefulness. Some of these results have probably not been published before. If this is the case it should have been said explicitly.

One chapter is devoted to the relationship with ARIMA models. However, there is no comparison with the widely used ARIMA model based seasonal

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adjustment method TRAMO-SEATS, see Gómez and Maravall (2001). Nor is there a discussion on application issues; e.g., what to do with ubiquitous outliers. The paragraph on multiple seasonal patterns seems to be unique, and could be very useful in some applications.

A model can be considered as a filter that changes the data to white noise. The word 'smoothing' in ES emphasizes the fact that one is dealing with a filter, which in this case is one-sided (causal). In Chapter 13 there is a short but nicely written section on filtering. However, more could have been said on this issue, e.g., using spectral analysis to highlight the characteristics of ES filters. One important matter that should have been mentioned in connection with this is the time shift introduced by ES, as by any causal filter. For an application taking advantage of the time-shift, and where the smoothing parameter is chosen so as to obtain both the optimal smoothing and the optimal lag, see Koskinen and Öller (2004). The SS approach should also be well suited to Bayesian methods, e.g., for choosing the parameter for a damped trend, but this issue is not discussed in the book.

The final chapters contain an excellent exposé on financial modeling, a short but elegant comment on macroeconomic time series and a chapter on inventory control, where the modeling of censored data is described. Here I missed a reference to the Nobel laureate James J. Heckman, see Heckman (1976). However, the application of the SS version of the Beveridge–Nelson filter to macroeconomic data is appealing, as are the many applications and exercises. This makes the book ideal for an advanced course in time series analysis, although the modest authors in the preface recommend the book only as an autodidactic device for researchers.

This book has few shortcomings. Sometimes there may be repetitions which are slightly disturbing, but this is something that can easily happen with four authors and with previously published material being pasted. Having references backward in a book avoids needless repetition, but references forward should be avoided, and this unfortunately happens a few times at the beginning of the book.

The authors' knowledge of and enthusiasm for the subject are apparent throughout the book. It is bound to be a great success for many years to come, and is warmly recommended.

References

Gómez, V., & Maravall, A. (2001). Seasonal adjustment and signal extraction in economic time series. In D. Peña, G. C. Tiao, & R. S. Tsay (Eds.), *A course in time series analysis*. New York: J. Wiley & Sons.

Harvey, A. C. (1989). *Forecasting structural time series and the Kalman filter*. Cambridge: Cambridge University Press.

Heckman, J. J. (1976). Common structures of statistical models of truncation, model selection and limited dependent variables and a simple estimator for such models. *Annals of Economic and Social Measurement*, *5*(4), 475–492.

Koskinen, L., & Öller, L.-E. (2004). A classifying procedure for signalling turning points. *Journal of Forecasting*, *23*, 197–214.

Lucas, R. E., Jr., & Rapping, L. A. (1970). Price expectations and the Phillips curve. *American Economic Review*, *59*(3), 342–351.

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