even harder to do a logistic regression, and very hard to fit a generalized additive model. This chapter suggests that Lyapunov components from the tangent maps can be done via the QR decomposition—without addressing the issue of whether a QR decomposition can be effected for a matrix with millions of rows and perhaps scores of columns. Certainly, this reviewer cannot compute such a QR decomposition on his computer. It would have been nice for the author of this chapter to let the reader know how to compute Lyapunov exponents for large data sets; after all, he is recommending their use in data mining. Chapter 22, "Techniques for Mining Geospatial Databases," presents several graphs for detecting outliers; with a million observations, all these graphs would be just clouds of ink, and the authors provide no guidance on how to use these graphical methods with large data sets.

In a rare exception, Chapter 9, "Psychometric Methods," does tangentially address the issue of large data sets, and in a very powerful way. After discussing the basic latent class model (LCM), the authors of Chapter 9 begin a most instructive series of paragraphs, "To enhance the utility of LCM modeling to handle complex and massive data sets, the basic LCM needs to be expanded." After which follows an extended discussion of how to so expand the LCM to large data sets. If only the editor had instructed each author to do similarly, to take the time and trouble to specifically relate the topic of the chapter to large data sets, this quality of this handbook would have increased by an order of magnitude. But alas, the editor provided no such instruction.

This could have been a great volume, but it is not. It is useful–for now–but before too long someone will write or edit a much more useful book. While libraries should purchase this volume, individuals would do well to wait for something better to come along.

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Michael P. Clements, *Evaluating Econometric Forecasts of Economic and Financial Variables*, Palgrave Texts in Econometrics, 2005, 173 pp, ISBN 1-4039-0173-2 (paperback), £19.99, ISBN 1-4039-0172-4 (hardback), £50

Readers of this journal know the author as an Editor of and frequent writer in *IJF*. He is also well known for the two books on forecasting he wrote jointly with D.F. Hendry. They were reviewed in *IJF* (2000), 425–426, and *IJF* (2001), 133–134. These were rather voluminous books on econometric forecasting in general. Here he has chosen to write a smaller book on a very special subject: *the evaluation of forecasts*.

When I first saw the announcement about this book, what came to my mind were some measures of mean error and a couple of tests. I was quite impressed that the author could fill a whole book on the subject. He gives an exposé of the conventional techniques, but also an overview of recent developments that may not be familiar to an ordinary reader of *IJF*. Briefly, models are getting more complex, and so must the methods for evaluating their forecasts. People are not content with point forecasts anymore, they may want to assess future risk through volatility forecasts, or they may need interval, or even density forecasts. The model does not have to be linear and the loss function of the forecaster may be asymmetric. All these topics are thoroughly discussed in this well-written book. It may be added here that forecast evaluation is now topical in the literature. Three recent articles on evaluation are Granger and Jeon (2003a, 2003b) and Peña and Sánchez (2005).

The first chapter is on point forecasts and contains all the concepts one needs, starting with the regression test for (univariate) rationality. The test is open to criticism from the point of view that regression residuals may be autocorrelated, in which case the *t*-values of the regression coefficients are biased. Autocorrelation is in itself a sign of irrationality. The author suggests testing the residuals in a second step for correlation over time or with any other series known at the time (multivariate rationality). To test for bias and autocorrelation *simultaneously*, we have suggested whitening forecast errors by regressing them on a constant (bias) and a couple of lags (autocorrelation), see Öller and Barot (2000).

For comparing rival forecasts and encompassing, the Morgan-Granger-Newbold and the Diebold-Mariano tests are presented both for general forecast evaluation and for the case when the model generating the forecasts is known. The matters become more complex with nonlinear (SETAR and Markov switching) models, especially when considering multi-step forecasts. The author uses AR models as benchmarks. Even more important benchmarks are various naïve projections made in order to assess whether the forecasting endeavor is sensible in the first place. In a book on forecast evaluation I think omitting naïve benchmarks and the Theil measures is a shortcoming.

While in macroeconomics expected values still dominate, in finance the second moment reflecting risk is getting more and more popular. ARCH and GARCH models produce volatility forecasts. They get good coverage in a separate chapter of the book, ending in recent developments in evaluation of volatility forecasts. Allowing non-constant variance does not affect the expected value, but of course the variance of the forecast will depend on where we are standing right now.

I must admit that before I read this book I did not know the difference between interval and density forecasts. The former requires the latter, I thought. Quoting the author: "An interval forecast is a prediction of the range in which the outcome will occur (with pre-assigned probability)". Density forecasts, on the other hand, provide a "...complete description of the probabilities the forecaster attaches to all possible values or ranges of values of the outcome variables". Interval forecasts are particularly interesting where ARCH-type models are used to forecast financial data. This is illustrated with an illuminating empirical example that uses GARCH models on financial data.

There is a connection between interval and density forecasts. The latter "...can be viewed as being comprised of a sequence of interval forecasts generated by allowing the nominal coverage rate to vary over all values in the unit interval". The key tool is *the probability integral transform*. Being so important I would have preferred a more detailed description of this concept. The empirical illustration is about the 'the rivers of blood' fan charts showing probability intervals for the inflation rate in the UK. Important as the example undoubtedly is, it does not help much in understanding the technique, properly.

Most forecast evaluation is based on a quadratic, or at least a symmetric, loss function. But in reality, the forecast user need not value upside and downside risks equally. One should in each situation try to establish a connection between forecasts and gains/losses. Also, different persons may have different loss functions. In that case a forecast based on a quadratic loss function will be optimal for all users only if the forecast densities are identical to the true densities. Finally, actions may affect outcomes. A case in point is inflation targeting. If a central bank reacts to a forecast by changing the interest rate, the alarming forecast may per definition prove wrong, and should indeed do so if there is any relationship between interest rates and inflation.

The last chapter presents some Gauss programs for estimating, forecasting and evaluating SETAR and GARCH models. The references contain 202 titles, seven of which are from *IJF*.

The book is based on thorough work resulting in a quality book. I found only five typos. I would have liked a few more well-explained and illuminating empirical examples, but this could be a matter of taste. Having recently reviewed the book Zellner (2004), I can't help missing the Bayesian dimension, especially where density forecasts were discussed. That said, I recommend this book to all forecasters who want to widen their views on forecast evaluation. It should also make an excellent reference for Associate Editors and referees when, as sometimes happens, manuscripts submitted to this journal contain poor forecast evaluations.

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Gunnar, Bårdsen, Øyvind, Eitrheim, Eilev S. Jansen, Ragnar Nymoen (Eds.), *The Econometrics of Macroeconomic Modelling, Published in the series "Advanced Texts in Econometrics"*, Oxford University Press, Oxford, 2005, 360 pp., ISBN: 0-19-924650-5, Paperback, £29.99

The book consists of 11 chapters plus an Appendix. As the authors point out, the focus of the book is on model building and testing macroeconomic theories rather than arbitrarily imposing a macroeconomic theory and attempting to test it. The empirical model discussed throughout the book refers to the one used by the Research Department of Norges Bank over the past 15 years.

Chapter 1 provides an overview of the subsequent chapters in the book. The chapter points out that Norwegian macroeconometric models have changed radically since they were introduced in the 1960s. In particular, their focus has shifted away from the need to run the economy through regulated markets. More emphasis now is placed on the analysis of liberalised financial and credit markets. Doing so has led to an increased demand for forecasting analysis. Chapter 2 discusses the interaction between economic theory and econometric modelling. The authors adopt the philosophy that although economic theory provides some guidance on how to specify an econometric model, empirical determination is always necessary to reach the "final model".

Chapter 3 introduces Aukrust's model of inflation, an empirical version of which is discussed in Chapter 4. The model distinguishes between price takers in the exposed sector and price setters in the sheltered sector, the latter producing non-traded goods. The model relies on (i) cointegration between wages, prices and productivity in the exposed sector, (ii) stationarity of the relative wage between the exposed and the sheltered sectors, and (iii) sheltered sector wages following wage movements in the exposed sector. As a result, productivity in the exposed sector determines wage developments in the sheltered sector.

The real action (in terms of empirical modelling) takes off with Chapter 4. The Phillips curve is discussed as a special case of Aukrust's Norwegian model of inflation and a system of wages, prices and unemployment is estimated for Norway. The empirical model includes error correction analysis and the Lucas' critique is addressed in terms of parameter stability tests. Empirical modelling continues in Chapter 5 where the Layard–Nickell wage curve model of incomplete competition is addressed based on detailed cointegration tests using UK and Norwegian data. Chapter 6 puts together a unified version of the Norwegian model, the Phillips curve and the Layard–Nickell wage curve model. Detailed empirical results are reported for the UK and Norway. Chapter 7 focuses on the New Keynesian Phillips curve. More specifically, an empirical version of price inflation with forward-looking expectations is reported for the Euro area and the Norwegian economy.

Chapter 8 shifts away from labour market considerations. It discusses the money–inflation relationship based on cointegration tests and error correction analysis using data for the Euro area and Norway. Detailed forecasting analysis is also reported. The main finding for Norway is that monetary measures do not play a significant role in explaining or predicting Norwegian inflation. Chapter 9 puts together a detailed model of prices, wages, output, unemployment, the exchange rate and interest rates on government bonds and bank loans. Assuming exogeneity of the short-term interest rate, the model seems to successfully forecast Norwegian inflation. Chapter 10 relaxes the assumption of exogeneity of the short-term interest rate. This chapter introduces a Taylor-type interest rate reaction function, with the interest rate depending on the inflation gap, the output gap and the real exchange rate. Counterfactual simulations suggest that a monetary policy rule, without the need to consider exchange rate misalignments, works well for Norway.