

conceptual aspects that he emphasizes. This represents a consistent pattern throughout the volume. There are no proofs and readers interested in the more technical details would have to pursue some of the key references that are provided as an entrée into the literature.

The second chapter addresses the issue of whether an empirical model is any good or not. For practitioners it presents some clear arguments that they should not take for granted the evaluation of econometric models and their forecasts. In particular, one should think carefully about the appropriateness of using the usual fit statistics and their associated squared error loss functions.

Using Hall's theory of consumption, Granger emphasizes that it is possible for more than one model to explain the stylized facts of some phenomenon. It becomes necessary to look beyond within-sample criteria to evaluate models. Granger is a strong advocate of evaluating models on the basis of forecasting performance. But even here, where there is a well-developed literature, Granger asks some basic questions. In particular he stresses that there is nothing intrinsically compelling about conventional symmetric loss functions. In many cases the choice of squared error loss functions is based on mathematical convenience. There are many situations where costs are clearly asymmetric.

In terms of the evaluation process, Granger suggests that model 'relevance' should be given more prominence. What economic decision was the model supposed to help with and does it meet this requirement? Consistent with the need to evaluate models 'post-sample', Granger stresses that a:

... theory or model should be evaluated in terms of the quality of the decisions that are made based on the theory or model [p. 56].

A potential problem with such an approach is the difficulty caused by post-sample changes in the data-generating process. I would add that there is also a problem with implementation. For many researchers it is relatively easier and more timely to use within-sample evaluations than to wait for the passage of time and to monitor the quality of decisions made on the basis of a particular model.

While the third chapter was not part of the lecture series the material represents a seamless continuation of the first two chapters. Although Granger describes the chapter as 'using a more sophisticated level of mathematical argument', we have already mentioned that this is not a tech-

nically demanding monograph. Any potential problems in this regard are minimized by dividing the material into formal and informal sections.

A common theme in this last chapter is that evaluation using squared error loss is only one approach and that to a large extent the popularity of its use is linked more to convenience than to anything intrinsic. Granger demonstrates how various issues can be addressed in the framework of more general cost functions. In such a context a natural question to ask is whether the forecasts from model 1 are superior to those of model 2 irrespective of the cost function to be utilized by forecast users. Such a question is addressed with reference to the concept from uncertainty theory known as second-order stochastic dominance. Notice that within this extended framework one needs to work with predictive distributions rather than just the expectation of the future value and sometimes its variance.

While there is plentiful discussion of issues and concepts there is little discussion of the practicalities. For example, how does one test for second-order dominance? How do you estimate predictive distributions? There are some references leading to appropriate material but it is clear that this is a relatively under-developed area of econometric research.

Granger hopes 'that the ideas presented will influence others to think further on these and related topics'. In this regard I feel he has been successful. Because the material is pitched at a relatively non-technical level it can be recommended for students, either advanced undergraduates or postgraduates. The book would be a useful addition to a list of extra readings for a course in forecasting or applied econometrics. The material is well written and interesting and provides an insight into the work and current thoughts of someone whose name is associated with many fundamental contributions in econometrics.

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*Nonparametric Econometrics*, by A. Pagan and A. Ullah (Cambridge University Press, Cambridge, UK, 1999), pp. xviii + 424.

The description 'nonparametric' seems to be used in two different ways in the statistical and econometric literature. The older use of the word refers to tests (such as Wilcoxon, Mann-Whitney, etc.) which don't rely on classical normality assumptions, and which are often based on ranks rather than raw data. More recently, the term has been used to refer to smoothing techniques, especially in density estimation and regression. This book takes the more modern definition of 'nonparametric' and covers a large range of smoothing methods which can be applied in econometrics.

It is a very welcome addition to the econometric literature, providing the first general survey of nonparametric smoothing methods designed specifically for econometricians. The wider statistical community has been using nonparametric smoothing methods for 15 to 20 years, and there are some excellent general surveys written for statisticians such as Simonoff (1996) and Loader (1999). There are also some excellent surveys focusing on kernel and local regression methods such as Azzalini and Bowman (1997), Wand and Jones (1995) and Fan and Gijbels (1996). But all of these omit some issues of key interest in econometrics. Pagan and Ullah have now filled this gap in the literature.

They mostly consider regression models and their variations, and describe how the models can be estimated so the functional relationships are non-linear and estimated nonparametrically. For example, they consider the relationship between income and age where the standard parametric approach in labour economics is to assume a quadratic relationship which is estimated using least squares regression. The nonparametric approach is to make no assumptions about the form of the relationship, and to estimate it by a smooth curve (which turns out to have a flatter peak than the quadratic curve).

The other surveys of the field concentrate on density estimation and nonparametric (single-equation) regression, and consider various statistical methods which aren't widely used in econometrics (such as generalized linear models, and methods used in survival analysis). A glance at the table of contents of this book reveals how it differs from the other surveys of the field, in covering a larger range of applications of particular interest to econometricians.

1. Introduction
2. Methods of density estimation

3. Conditional moment estimation
4. Nonparametric estimation of derivatives
5. Semiparametric estimation of single-equation models
6. Semiparametric and nonparametric estimation of simultaneous equation models
7. Semiparametric estimation of discrete choice models
8. Semiparametric estimation of selectivity models
9. Semiparametric estimation of censored regression models
10. Retrospect and Prospect

There is also an appendix on statistical methods which is surprisingly detailed, and which will be a useful reference in its own right.

The flavour of the book is theoretical rather than practical. Each chapter surveys the range of methods that have been proposed, discusses finite sample and asymptotic properties including bias, variance, and consistency, when observations are iid and under some mixing conditions. Consequently, this book will be an invaluable reference for econometricians seeking to develop and adapt nonparametric and semiparametric techniques.

At times, the coverage is almost encyclopedic with thorough bibliographic summaries and reviews of the relevant literature, especially in pointers to econometric applications. In other places, the coverage is too brief to be of much use—for example, the sections on generalized additive models and neural networks. Surprisingly, loess is not even mentioned despite being one of the most popular smoothing methods available in statistics packages.

For someone seeking intuition about the methods, or practical advice on their application, this is not the best book with which to start. There are very few applications given, with just a short section at the end of some chapters providing one or two relatively simple examples. In fact, it might be better to read each example section first, before reading the rest of the chapter, as it provides some motivation and graphical intuition for what is discussed earlier. Books with greater emphasis on the application of the methods to real data include those of Azzalini and Bowman (1997), Simonoff (1996) and Loader (1999).

I was disappointed in the level of graphics the authors have employed to explain or demonstrate the methodology. Graphical techniques have developed in parallel with nonparametric smoothing (see, for example, Cleveland 1993),

and provide much useful understanding about their applicability and dangers. But there were only a handful of figures in the whole book, all in the examples sections, and every one is poorly produced.

The lack of exercises and relatively few examples will ensure the book is not immediately useful as a textbook for graduate courses. Instead, the book will be most useful to researchers in econometrics, including graduate students, who need a thorough survey of the vast nonparametric literature which is now available. Mostly, the book does this extremely well and I will use it as a useful reference tool when I need to check, for example, the conditions under which a particular technique will converge, or when I am looking to see what work has been done in developing nonparametric or semiparametric alternatives to well-known econometric techniques.

The authors' original aim was to

produce a book that paralleled traditional econometric texts in the sense of explaining how one might perform the same analysis as was done parametrically in those books but in a nonparametric way.

Although this aim was not able to be fully achieved, the authors have done a splendid job of producing a book which will make nonparametric smoothing methods much more widely known to the econometric community.

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*Irrational Exuberance*, by Robert J. Shiller (Princeton University Press, Princeton, New Jersey), pp. xxi + 296.

In this very interesting book Professor Shiller examines the causes and consequences of the current long-running boom in the US stock market.

The book's title 'Irrational Exuberance' derives from Alan Greenspan's comment on 5 December 1996. This sets a nice tone for examining how the US stock market got to its current level, whether the factors that have led the US stock market to its current level are sustainable, and what are the policy consequences.

The book is structured as follows. Chapter one places the current level of the US stock market into a historical context. The current peak in the US stock market is shown to be higher than the previous peaks attained in 1901, 1929 and 1966. The chapter also points out the poor performance of the market in real terms after attaining these peaks.

Chapter two identifies a number of factors associated with the current boom; the internet, the decline of foreign economic rivals, cultural changes favouring business success, a Republican congress and cuts to capital gains tax, the baby boom, expanded media reporting of business news, increasingly optimistic forecasts by stock analysts, an expansion in defined contribution pension plans, the growth in mutual funds, decline in inflation rates, expansion in trading volume, and the rise in gambling.

In chapter three the book argues that the influence of these factors has been amplified by mechanisms around investor confidence and feedback loops that create the equivalent of naturally occurring Ponzi schemes. Chapter four examines the role of the media and their link to the formation of bubbles. The chapter also examines the role of news in the crashes of 1929 and 1987. The chapter finds that large stock price movements are typically not associated with major news. Instead, the influence of the news media seems to be important in feedback loops.

Chapter five discusses how 'new era' economic thinking has typically been associated with stock market booms. By drawing historical comparisons, the book points out that new era economic thinking was also associated with the peaks in 1901, 1929 and 1966. Chapter six then extends the new era analysis to examine stock markets other than those in the US. The chapter also discusses the large change in market performance once the new era thinking and the bubbles end.

In chapter seven, the role of psychological anchors for the market is discussed. In chapter