

# Introduction to *A Bibliography of Business and Economic Forecasting*

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The forecasting bibliography is indexed for use by three kinds of user: consultants, internal or external; academic researchers; and managers or management students. These users have slightly different needs. The consultant or manager chiefly wants examples of previous forecasting work in a specific sector of the economy, on a specific class of problems (e.g. a declining product in the processed food industry). The academic researcher will be more interested in the theory underlying a forecasting method. The novice will be unfamiliar with technical terms and with theoretical ideas in most of the fields. In practice, these three types overlap. Most users of the bibliography will find themselves “novices” in at least some of the fields from which the bibliography is drawn.

The publication of this bibliography proved more difficult than expected, despite the support of both the Operational Research Society and the SSRC. We believe that the typical user will find the effort has been worthwhile, for we have tried to do much of his preliminary research work for him. This bibliography contains over 5,400 journal articles and books collected from a search of more than 50 journals over the period 1965-1969. The entries are key worded according to a carefully chosen structure, which allows easy access to some 500 topics of research. Consequently, it is possible to use the bibliography for a wide range of forecasting problems in business and economics.

The set of key words should meet the needs of the various users. For the consultant’s use, we have classified examples of forecasting not only by the variable being forecast and the method used, but also by the use to which the forecast is put (e.g. inventory control, media planning). All major estimating methods are key worded, as is evidence on the comparative performance of different forecasting methods. For the benefit of academic researchers, we have key worded a number of theoretical issues in forecasting, such as the error specification in forecasting models, the stability of the model’s coefficients, causality and the effects of bad or incomplete data. For the sake of the “novice” we have tried to avoid abbreviations and certain technical terms.

We labeled some of articles as either BASIC or ADVANCED,<sup>1</sup> as a guide to the level of mathematical complexity. A BASIC article is normally nontechnical. We have used the term ADVANCED for articles that are heavily quantitative and, for example, make use of complex variable theory or asymptotic multivariate statistical theory. ADVANCED articles are potentially of value to highly specialized researchers, but most are of little general value because of their inaccessibility.

The range of materials included goes far beyond articles with the words “forecasting”, “planning” or “prediction” in their titles. We have included a wide range of topics on applied economics and statistics, time-series analysis, estimation, control theory, and data characteristics. We also included articles on subjects such as population, social problems like crime, disease and poverty, accidents, and natural phenomena such as earthquakes.

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<sup>1</sup> Actual words are printed in all capital letters.

In summary, the aim of the bibliography is to provide a simple method for identifying references that touch on the forecasting problem under analysis, whoever the forecaster, manager, consultant, academic, or student.

## Using the Bibliography

To help readers make effective use of the bibliography, we provide three typical examples where a forecaster would find it helpful to consult the bibliography.

The first example described is typical of the questions that concern a corporate planner or marketing manager when planning the firm's medium-term marketing strategy. How effective is the firm's advertising, and at what level should it be set over the planning horizon?

### 1. "What is the effectiveness of consumer durables advertising?"

Two key words specify this question, ADVERTISING - EFFECT OF and APPLICATION - SECTOR (or FIRM): CONSUMER DURABLES. The researcher can quickly find articles that contain both key words. He also notes a review article on advertising effectiveness which helps considerably. By examining the studies cited, he realizes that a problem is posed if he wishes to estimate advertising effectiveness, for many early studies used only simple estimation techniques and found non significant coefficients - but a recent review article in the *Journal of Marketing Research* reassures him. He has the choice of specifying the coefficient (and lag structure), without reference to the data, using another key word, PRIOR INFORMATION, or he may choose to use a more complicated estimation technique. The subsidiary question of how best to fix the advertising budget is discussed under ADVERTISING - OPTIMALITY. How advertising is actually set is considered under ADVERTISING - DETERMINANTS.

In a second example, suppose that the forecaster, new to working an Operational Research department, wishes to check that the inventory control system is functioning well enough.

### 2. "What is the relationship between inventory control and forecasting?"

Two key words mention inventory control directly: (1) USE - INVENTORY CONTROL and (2) LOSS FUNCTIONS - FIRM, Inventory. Following up the references listed under these two headings he learns that relatively little work has been done in linking forecasting to inventory control problems (1 above), and that the loss likely to be incurred in an inventory situation like his own appears small (2 above). However, a reference on "materials requirements planning" shows him the potential importance of focusing on (3) TIMING UNCERTAINTY with regard to deliveries of partly finished goods. The references already examined suggest that two methods of long standing, exponential smoothing and adaptive smoothing [key words (4) EXPONENTIAL SMOOTHING and (5) EXPONENTIAL SMOOTHING - ADAPTIVE COEFFICIENTS], still appear relevant to inventory control; which raises the next question. Is any one of the computationally cheap forecasting methods noticeably better than its competitors? The references under key words (6) COMPARATIVE METHODS - TIME SERIES MODELS and (7) COMPARATIVE METHODS - EXPONENTIAL SMOOTHING, Adaptive, suggest only slight differences. The added complexity of adaptive smoothing appears not to be worthwhile. A final check that nothing has been missed (9)

COMPARATIVE METHODS - THEORY, suggests that if demand patterns are unstable, it is safer to opt for the added complexity of adaptive smoothing:

3. "How should one use regression models to obtain estimates of relationships?"

The bibliography can help resolve methodological questions. Is least squares the best method of model estimation and when is it poor? When should we transform a model? Is it worthwhile to go to the extreme of including a complicated error dependence in the model to remove any possible auto correlation? To solve multicollinearity is ridge regression helpful? The key words with annotations which should be referred to are:

- 1 COMPARATIVE METHODS - ESTIMATION: Regression. How should we estimate a regression model?
- 2 COMPARATIVE METHODS – REGRESSION: Error specification. Does the autocorrelation matter in a regression model?
- 3 COMPARATIVE METHODS - ESTIMATION: Regression, Error specification. If we decide the autocorrelation is important enough to include, we need to know how to estimate the more complicated equation.
- 4 MULTICOLLINEARITY - EFFECT OF: Does multicollinearity matter?
- 5 REGRESSION - RIDGE and REGRESSION – RIDGE EVALUATION: These key words describe ridge regression and offer an evaluation of its effectiveness. Comparative performance can be considered through COMPARATIVE METHODS - ESTIMATION, Regression, Ridge.