Chapter 2
Economic Forecasting Techniques and Their Applications

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ABSTRACT

Forecasting techniques have a widespread area from simple regression to complex metaheuristics like neural networks and genetic algorithms. Economic forecasting is the process of attempting to predict the future condition of the economy. It is the projection or estimation of statistical measures of the performance of a country, group of countries, industry, firm or community. This involves the use of these techniques utilizing variables sometimes called indicators. Some of the most well-known economic indicators include inflation and interest rates, GDP growth/decline, retail sales and unemployment rates. While economic forecasting is not an exact science, it remains an important decision-making tool for businesses and governments as they formulate financial policy and strategy. Concepts forecasted are often standard measures of economic or business results such as production, employment, prices, incomes, spending, sales, profits and other similar statistics. This chapter summarizes and classifies the forecasting techniques from classical logic to fuzzy logic and from metaheuristic techniques (e.g. neural networks or ant colony optimization) to integrated metaheuristics (e.g. neuro-fuzzy). The chapter also includes numerical examples.

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1. INTRODUCTION

Forecasting involves the use of information at hand to make statements about the likely course of future events. In technical terms, conditional on what one knows, what can one say about the future? Forecasting techniques include uni-variant, multi-variant, and qualitative analysis. Time series used to forecast future trends include exponential smoothing, ARIMA (Autoregressive Integrated Moving Average) and trend analysis. Multi-variant prediction methods include multi regression model, econometrics, and state space. Delphi marketing research, situational analysis, and historical analogue belong to qualitative methodologies. These forecasting methods forecast trends over different time horizons. There are significant differences in time length being considered when using these forecasting methods. Basically, uni-variant methods in short-term forecasting usually generate higher accuracy than those of multivariants (Box et al., 1994).

Economic forecasting is the process of making predictions about the economy as a whole or in part. It is the prediction of any of the elements of economic activity. Such forecasts may be made in great detail or may be very general. In any case, they describe the expected future behavior of all or part of the economy and help form the basis of planning. Economic forecasts derive from models--usually of the aggregate national or global economy, but sometimes of parts of those economies: particular industrial sectors, regions of the world or even single products or firms. Basic approaches to forecasting simply extrapolate the past; more sophisticated models attempt to understand the sources of past changes and build them into their forecasts. The latter requires knowledge of economic history and economic principles, though, even then, forecasting is by no means an exact science. Much of the output of financial market models is naturally closely guarded in the hope that it may bring advantage to its owners and their clients. But, at the same time, investment economists like to maintain a public profile for marketing purposes, and are often called on by the media to give their opinion on the latest macroeconomic developments. Their interpretations of economic data may give some clues as to how the financial markets will react, though more often than not, they are explaining why the markets have already reacted as they did. Invariably, too, there are disagreements about what various indicators mean, depending on different beliefs about the economy, and whether the firm is taking an optimistic or pessimistic view of the markets.

There are many types of economic forecasting techniques. These techniques can be classified as follows: Forecasting with linear and nonlinear regression models, forecasting with confidence intervals, forecasting with time series including seasonal, ARIMA, exponential, and stochastic series. For a few decades, intelligence forecasting techniques including fuzzy models, neural network models, expert systems, meta-heuristics models, grey theory models, and integrated models of these have emerged.

For classifying forecasting methods, Makridakis et al. (1983) provided a simple framework as seen in Table 1. The type of pattern experienced and the type of information available are two dimensions to describe forecasting situations. The type of pattern experienced might be one where history was expected to repeat itself, which was where the historical pattern was expected to continue into the future, or one where the pattern depended on external factors as well as historical observations. In certain forecasting situations, quantitative historical data can be available, such as sales quantities. In other situations, only qualitative data can be available, such as executive opinions.

Past data plays an important role in forecasting. The accuracy of forecasts is influenced both by the quality of past data and the method selected to forecast the future. Real world data are often “noisy” and possibly contaminated by inaccuracies.