Forecasting Macroeconomic Variables Using Artificial Neural Network and Traditional Smoothing Techniques

Emrah Önder
İstanbul University, İstanbul, Turkey
emrah@İstanbul.edu.tr

Fırat Bayır
İstanbul University, İstanbul, Turkey
firat.bayir@gmail.com

Ali Hepşen
İstanbul University, İstanbul, Turkey
alihepsen@yahoo.com

For many years, economists have been using statistical tools to estimate parameters of macroeconomic models. Forecasting plays a major role in macroeconomic planning and it is an essential analytical tool in countries' economic strategies. In recent years, researchers are developing new techniques for estimation. Most of these alternative approaches have their origins in the computational intelligence. They have the ability to approximate nonlinear functions, parameters are updated adaptively. In particular, this research focuses on the application of neural networks in modeling and estimation of macroeconomic parameters. Neural networks have received an increasing amount of attention among macroeconomic forecasters because of the ability to approximate any linear and nonlinear relationship with a reasonable degree of accuracy. Turkey is one of the European Union candidate countries such as Iceland, Montenegro, Serbia, and The Former Yugoslav Republic of Macedonia. In this study 13 macroeconomic indicators including gross domestic product (volume), current account balance, general government gross debt, general government revenue, general government total expenditure, gross national savings, inflation, average consumer prices, population, total investment, unemployment rate, volume of exports of goods and services, volume of imports of goods and services. In this study classical time series forecasting methods such as moving averages, exponential smoothing, Brown's single parameter linear exponential smoothing, Brown's second-order exponential smoothing, Holt's two parameter linear exponential smoothing and Winter's linear and seasonal exponential smoothing were applied to macroeconomic data. The study focuses mainly on the

applicability of artificial neural network model for forecasting macroeconomic parameters in long term and comparing the artificial neural network's results with the Traditional Time Series Analysis (Smoothing Techniques). To facilitate the presentation, an empirical example is developed to forecast Turkey's important macroeconomic parameters. Time Series statistical theory and methods are used to select an adequate technique, based on residual analysis. Turkey will celebrate the 100th anniversary of its foundation in 2023. Policies and implementations targeted for raising economic position.

Keywords: Macro Economic Parameters, Economic Growth, Artificial Neural Network, Forecasting, Smoothing, Time Series, Turkey.