Short-term Forecasting System Using Machine Learning and MIDAS Models

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To heighten the accuracy of the economic growth rate forecast, it is important to constantly supplement forecasting model groups in reflection of the latest forecasting techniques. This paper expands the Bank of Korea's short-term forecasting system by adding the increasingly researched machine learning model and mixed-data sampling (MIDAS) model, and assesses the forecasting results based on the expanded system.

The Bank of Korea short-term forecasting system estimates economic growth rates for the current and following quarters by calculating the weighted average of the forecasts using models with great forecasting performances among the forecasting model groups. For this research, a machine learning model and MIDAS model, which are known to enhance economic forecasting performances, have been added to the existing forecasting system, which has been constructed using mainly a linked model. A linked model estimates economic growth forecasts by converting various monthly information variables into quarterly ones. A machine learning model is a type of non-linear regression model that uses a self-learning process to constantly improve predictive power whenever data are added. The MIDAS model uses monthly data as direct explanatory variables for quarterly growth forecasts, without converting monthly data into quarterly figures. Therefore, in this model, the predictive power for the forecasts is improved by ruling out the prediction errors that occur in the course of estimating missing values to convert data from monthly to quarterly values.

According to the results of the forecasting performance on the expanded short-term forecasting system, the added machine learning and MIDAS models are

found to improve the predictive power of the forecasting system. Looking into the predictive power for each model, none of the three models shows better performances, but the MIDAS model shows relatively good results for the forecast for the current quarter, and the machine learning model shows better results for the forecast for the following quarter. The forecast calculated by combining various models based on performance results generally succeeds in capturing actual economic growth movements.

The expansion in the forecasting system is expected to reduce the dependence on specific forecasting techniques and systemic prediction errors, since this allows us to operate the economic growth forecasting system based on multiple models. Going forward, it is necessary to accumulate know-how on forecasting techniques in the course of actual operation of the expanded system, and to constantly improve it in reflection of recent research results from the academic circle.

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Ⅰ. Introduction

Ⅱ. Precedent Studies

Ⅲ. Expansion of Short-term Forecasting System

Ⅳ. Conclusion