Topics in Forecasting Macroeconomic Time Series

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Chapter 5

Summary

This thesis focuses on the topic of forecasting macroeconomic time series. First, I evaluate and compare the predictive ability among various forecasting models. The evaluation and comparison is made using a time-series of inflation. Particularly, I compare the forecasting ability of the Phillips curve against its extensions with time-varying parameters. The empirical results show that adding time-varying components, such as unobserved component and score-driven volatility, does not always lead to a forecasting model with greater precision. I find that the argument that a complex time-varying model can beat the simple linear model in terms of predictive accuracy is unfounded. In the second part, a weighted maximum likelihood estimation (WMLE) method is developed for forecasting macroeconomic time series. The WMLE is designed to optimise forecasting accuracy and recognises the potential misspecification of the model at hand. For misspecified time-series models, achieving a good in-sample fit over the entire data set becomes a separate problem from that of achieving good out-of-sample forecasting accuracy. I show that the WMLE outperforms the classical MLE in terms of forecasting accuracy when the model is misspecified. The WMLE method is applied to different macroeconomic data sets and different forecasting models.

I consider also two types of WMLE. The first weights each observation differently in the likelihood function. The second weights each variable differently in multivariate models.

For the first WMLE I show how to estimate the optimal weights using a cross-validation technique. An application of the WMLE to the U.S. industrial production index reveals that the forecasting accuracy during the latest global recession can be significantly improved by increasing the weights of observations corresponding to past re-

cession periods. This highly intuitive empirical finding shows that one should look more carefully at past recessions when the objective is to produce accurate forecast during the recent global financial crisis.

The second WMLE, is applied to high-dimensional time-series models. High-dimensional time-series models, such as dynamic factor models, are widely used to forecast some key macroeconomic variables with a panel of time series data. The WML method introduces variable-specific weights in the likelihood function to let the target variables have more importance than the related variables in the parameter estimation process. I find that, by applying the WMLE method, I can significantly improve the forecasting precision of key variables. The empirical study shows that the WML method for multivariate models can lead to significant improvements in the accuracy of nowcasting and forecasting U.S. GDP growth.