

# Learning from Forecast Errors: A New Approach to Forecast Combination

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## Abstract

This paper studies forecast combination (as an expert system) using the precision matrix estimation of forecast errors when the latter admit the approximate factor model. This approach incorporates the facts that experts often use common sets of information and hence they tend to make common mistakes. This premise is evidenced in many empirical results. For example, the European Central Bank’s Survey of Professional Forecasters on Euro-area real GDP growth demonstrates that the professional forecasters tend to *jointly* understate or overstate GDP growth. Motivated by this stylized fact, we develop a novel framework which exploits the factor structure of forecast errors and the sparsity in the precision matrix of the idiosyncratic components of the forecast errors. The proposed algorithm is called *Factor Graphical Model* (FGM). Our approach overcomes the challenge of obtaining the forecasts that contain unique information, which was shown to be necessary to achieve a “winning” forecast combination. In simulation, we demonstrate the merits of the FGM in comparison with the equal-weighted forecasts and the standard graphical methods in the literature. An empirical application to forecasting macroeconomic time series in big data environment highlights the advantage of the FGM approach in comparison with the existing methods of forecast combination.

*Keywords:* High-dimensionality; Graphical Lasso; Approximate Factor Model; Nodewise Regression; Precision Matrix

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