Dynamic Factor Model with Infinite Dimensional Factor Space: Forecasting

Mario Forni, Università di Modena e Reggio Emilia, CEPR and RECent, **Alessandro Giovannelli,** Università di Roma Tor Vergata, **Marco Lippi,** Einaudi Institute for Economics and Finance, Roma, **Stefano Soccorsi,** Università di Roma La Sapienza

Abstract. The paper compares the pseudo real-time forecasting performance of three different High-Dimensional Dynamic Factor Models:

-SW. This is the model introduced and studied in Stock and Watson (2002), Bai and Ng (2002), based on standard Principal Components. Calibration of SW requires deciding on inclusion of lagged values of the factors and the predicted variable among the predictors, fixed or variable number of static factors.

-FHLR. Based on Forni et al. (2005), this model shares with SW the existence of a static representation of the common components. However, it differs from SW in that the estimation of the factors is obtained in two steps: (1) the relative importance of the common and idiosyncratic components is estimated using frequency-domain techniques, (2) based on the results of step (1), the factors are estimated using generalized principal components. Calibration of FHLR: same as in SW plus (a) the number of dynamic (primitive) factors, (b) the kernel and the window size in the spectral estimation.

-FHLZ. Proposed in Forni et al. (2015) this model does not assume the existence of a static representation. Rather, it is based on the estimation of a blockwise AR model for the common components, obtained starting with the estimation of their spectral density. The block size is $q + 1$, where q is the number of dynamic (primitive) shocks. Calibration of FHLZ: same as in FHLR regarding the number of dynamic factors and spectral estimation, plus the lag in the AR representation of the common components.

Data. We use 115 time series belonging to the standard monthly macroeconomic and financial dataset for the US economy. The sample starts in January 1959 and ends in September 2014, thus including the Great Moderation, the Great Recession and the subsequent recovery. We use a rolling window of ten years and compare forecasts at horizons 1, 3, 6, 12. The period from January 1959 to December 1984 is used to calibrate the models, so that the corresponding forecasts are compared over the period from January 1985 to September 2014.

Results. Our main findings are:

(i) On average over the whole period, FHLZ is the best method for the forecast of inflation, CPI, while FHLR is the best for industrial production, IP.

(ii) Using Giacomini and Rossi (2010), we test for local relative forecasting performance. We see that before the Great Recession the differences between different methods are not significant. However, within the Great Recession period, FHLZ and FHLR significantly overperform the other methods for CPI and IP respectively. Thus methods that take the dynamics of the series into explicit consideration prevail when the data exhibit a more dynamic behavior.

(iii) The results in (i) are confirmed when we forecast each series in the dataset. We find that FHLR and FHLZ are the best predictors for real and nominal variables respectively.

Further results will be presented in the paper, which will be shortly ready.

References

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