

Forecasting turning points in the age of low economic cycle fluctuation

Previsione dei punti di svolta in periodi con bassa volatilità del ciclo

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Riassunto: In questa lavoro si presenta una combinazione di due metodi econometrici utilizzati per l'individuazione di punti di svolta della produzione industriale italiana. Inizialmente nel paper viene applicato un modello fattoriale di tipo dinamico, per la classificazione delle serie disaggregate (3 digit della classificazione Ateco) in coincidenti e leading rispetto all'indice generale. Questo risultato utilizzato all'interno di un modello logistico per la stima della probabilità di un punto di svolta. La performance dei risultati è analizzata sia in-sample che out-of-sample.

Keywords: generalized dynamic factors models, logit models, turning points

1. Introduction

Several studies have pointed out the importance of detecting and predicting forecast breakdowns especially for their consequence in terms of standard forecasting models. In order to address these question, in this paper we try to bridge together two different econometric methodologies, dynamic factor models and Logit model, to predict turning points for Italian general index of production (hereafter IPI). First, using the dynamic factor models proposed by Forni *et al.* (2001) we classify the disaggregated series (at three digit of NACE economic classification) of IPI as being leading, coincident or lagging according to their phase delay. Second, according to precedent studies (see for example Estrella and Mishkin (1998) Chin *et al.* (2000)), this information is included as independent variable in a Logit model where the dependent variable is the probability to obtain a turning point. We would like to explore the properties of this formulation especially for the recent years characterized by reduced variability of the economic cycle. At this stage of the work, we have to choice the best formulation of the Logit model and compare the results with previous studies.

2. The model

The basic idea in dynamic factor analysis, is that each process x_{it} $i \in N$, is the sum of a common component χ_{it} and an idiosyncratic component ξ_{it} . The common component is

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driven by a q -dimensional vector of common factors $f_t = (f_{1t} f_{2t} \dots f_{qt})'$ which are loaded with possibly different coefficients and lags. In compact form the model is :

$$x_t = \chi_t + \xi_t = B(L)f_t + \xi_t \quad (1)$$

Under suitable conditions, Forni *et al.* (2005) provide a two-step forecasting method for the common component and demonstrate that, as n , the number of time series, and T , the time series length go to infinity, this forecast is a consistent estimator of the optimal h -step forecast. As in Forni *et al.* (2001) estimated density matrix of the common component with respect to IPI is used to classify the time series as being leading, coincident or lagging according to their phase delay. At this point it is possible to estimate a coincident and leading indicator for IPI or selected the most important single variables in terms of the variance of the common component (see for example Bacchini (2003)). According to the chronology proposed in that study (see also Altissimo *et al.* (2000)), to detect the IPI Turning points it is possible to model a Logit model as:

$$P[TP_t = 1] = \frac{\exp(X\beta)}{1 + \exp(X\beta)} \quad (2)$$

where $TP_t = 1$ if a turning point occurs in month t and 0 elsewhere. For the independent variable X four different Logit models were estimated. Two are univariate based respectively on the leading and the coincident indicator. The other two are multivariate combining in different way leading and coincident information.

3. Data

The data set for this study consists of 90 time series that are the component at three digit level of NACE economic classification of Italian index of production. Series are monthly indexes adjusted for calendar effects (available at con.istat.it) and span from January 1990 to December 2006. Stationarity of the raw data has been reached removing the outliers and the seasonal effects according to the evidence coming from Tramo-Seats and two tests quite common in literature.

References

- Altissimo F., Marchetti D. and Oneto G. (2000) The italian business cycle: Coincident and leading indicators and some stylized facts, *Banca d'Italia, Temi di discussione*.
- Bacchini F. (2003) La costruzione di una stima anticipata dell'indice della produzione industriale italiana utilizzando un modello fattoriale dinamico, *PhD dissertation*.
- Chin D., Geweke J. and Miller P. (2000) Predicting turning points, *Federal Reserve Bank of Minneapolis, Research department staff report*, 267.
- Estrella A. and Mishkin F. (1998) Predicting u.s. recessions: Financial variables as leading indicators, *The Review of Economics and Statistics*, 80, 45–61.
- Forni M., Hallin M., Lippi M. and Reichlin L. (2001) Coincident and leading indicators for the euro area., *The Economic Journal*, 111, 62–85.
- Forni M., Hallin M., Lippi M. and Reichlin L. (2005) The generalized dynamic factor model one-sided estimation and forecasting, *Journal of the American Statistical Association*, 100, 830–840.