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The Use of Business and Consumers Surveys in ISAE' Cyclical
Analysis

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1. Overview

The Institute of Economic Studies and Analysis (ISAE), previously known as ISCO, is one of the funding institute of the EU Harmonised Project on Business and Consumers surveys; the Institute has also a long tradition of using survey results to provide cyclical analysis, together with short and mid term forecast, of Italian economy.

In this respect, in recent years ISAE has carried a number of research projects, involving the use of survey' results to construct an overall indicator of "economic sentiment", and to predict the cyclical behavior of key economic variables. The main recent projects involve:

- The construction of an indicator of economic sentiment[1]
- Forecasting Italian GDP components[2]
- Forecasting Italian Industrial Production and detecting its turning points[3]
- Forecasting Euro-Area Industrial Production[4]

In what follows, we provide a short description of these projects and of their main results.

2. The Construction of an indicator of economic sentiment for Italian economy

At the European level, and for each country in the EU, the European Commission has recently developed indicators of economic sentiment, calculated using only information from business and consumers' surveys. However, the Economic Sentiment indicators of the Commission are explicitly designed to fit better at the aggregate than at the country level. Even considering the growing synchronisation of European economies, there are still relevant cyclical and structural differences among the countries participating to the EMU: therefore, it seems that there is enough room to try to construct a Composite Aggregate Indicator, that may be interpreted as a Sentiment Indicator, for the Italian economy, specifically designed to fit the peculiar characteristics of the Italian cycle. For this purpose, the paper uses the class of dynamic factor models: in such a model, a variable (i. e. a single qualitative series from a survey) is supposed to be composed of one (or possibly

[1] G. Bruno, Malgarini M., *An Indicator of Economic Sentiment for Italian Economy*, Documento di Lavoro, n. 28/2002
[2] M. Bovi, Lupi C., Pappalardo C., *Predicting GDP Components Using ISAE Bridge Equations Econometric Forecasting Model (BEEF)*, Documento di Lavoro ISAE, n. 13/2000
[3] G. Bruno, Lupi C., *Forecasting Industrial Production and the early Detection of Turning Points*, Documento di Lavoro ISAE, n. 20/2001
[4] G. Bruno, Lupi C., *Forecasting Euro-Area Industrial Production Using (Mostly) Business Surveys Data*, n. 33/2003

more) dynamic factor(s), common to all the series of the survey, and an idiosyncratic component, specific to that variable. We firstly test for the number of such common dynamic factors, and then proceed to estimate them, with the aid of the Kalman filter, once the model is cast in state-space form.

We then apply the model to to the surveys for manufacturing, construction and retail sector and for the consumers. Firstly, the main cyclical features of the chosen indicator are compared with those of a reference series and of the corresponding usual ISAE-EC sectoral confidence indicator. Then the in-sample and out-of sample performance of the chosen indicator is assessed, estimating a fairly general and simple statistical model, including some lags of the reference series and of the chosen indicator. Finally, a Composite Aggregate Indicator (CAI) is built upon the four sectoral indexes computed previously; again, a dynamic common factor is estimated, and its ability of monitoring cyclical fluctuations of Italian economy, as represented by real GDP, is assessed. Some considerations about the results obtained and the possible future developments conclude the study.

3. Forecasting Italian GDP components

The need to get readily available and consistent predictions of National Accounts aggregates has led to the creation of a quarterly macro econometric model. It consists of nine stochastic non-behavioural equations, aimed at the prediction of the quarterly GDP identity from the expenditure side. In order to predict final internal demand, two different categories of consumers' expenditures and four of fixed investments are considered. Two equations, one for the exports of goods and services, the other for the corresponding imports, define the external balance block. A separate equation is estimated for changes in stocks. The GDP identity closes the model.

The model exploits short-term economic information within a variable-indicator statistical framework. A distinctive feature of the model is its use as predictors of a number of series derived from ISAE business surveys, all taken as balances of the qualitative answers. More in detail, consumption equations take into considerations, among others, a number of survey-derived variables (Households climate confidence index; Uncertainty index, estimated as the sum of "do not know" and "Indifferent" answers to the question on the

present convenience to purchase durables; Order book level in the domestic market from the "other manufacturing" sector). Fixed investment equations take into account production expectations in manufacturing, orders expectations in the construction sector, general economic situation expectations in manufacturing and obstacles to production. Estimation of exports' and imports' equations makes use of balances of general economic situation expectations in manufacturing, evolution of external orders, capacity utilization, and changes in stock of raw materials.

The model forecast horizon is limited to up to two quarters. Under this respect, and considering its non-structural nature, the model can be assumed as a bridge-equations one, conveying relevant information on National Accounts aggregates that can be used as endogenous variables in the context of larger structural quarterly macro econometric models. The predictive ability of each equation has been evaluated over the time interval 1999.3-2000.2. The reduced length of the out-of-sample forecast period is due to the shortness of the estimation sample, determined by the availability of some qualitative predictors. For each aggregate to be forecast, a benchmark ARIMA model has been defined. The relative performance of each equation with respect to the correspondent ARIMA has then been assessed by looking at the standard error of the estimated regression (as far as in-sample performance is concerned) and considering the mean error and the mean absolute error of the forecasts over the out-of-sample period. In spite of the model simplicity, the results appear to be very satisfactory, stressing the strong predictive ability of each equation and the usefulness of the whole model in forecasting the main National Accounts aggregates.

4. Forecasting Italian Industrial Production

Multi-step forecasting of industrial production index is useful with respect to many aspects. In fact, despite growing importance of the service sector, industrial production is still important in explaining aggregate business cycle fluctuations. Forecasts of industrial production can also be used as an input in larger models, which are often criticized for their (in)ability in tracking business cycle turning points. In this respect, the paper proposes the use of some leading variable to build a simple multivariate model so as to allow reliable monthly forecasts to be provided up to twelve months ahead.

The proposed model includes as explanatory variables the ISAE business survey series of future production prospects as well as the quantity of goods transported by railways; these two variables, together with industrial production, form a VAR model, specified via a general-to-specific approach. The forecast produced by the VAR model are evaluated with respect to those obtainable with a simple ARIMA model and by two other Italian research institutes[5]. Not only the ISAE model shows a better performance in terms of 1 and 2-steps ahead forecasts, but it is also able to provide reliable forecasts up to 12 months ahead, in this way reducing dramatically the uncertainty in estimating a cyclical indicator from the industrial production index at the very end of the series, which is a fundamental issue in short term economic analysis.

5. Forecasting Euro Area Industrial Production

The forecasting of euro-zone main economic aggregates can be done aggregating the national forecasts or forecasting the aggregate directly. This paper focuses on the monthly industrial production index for the euro area, which is forecasted with a direct as well as an indirect approach, using national leading information coming from qualitative business surveys.

Regarding the indirect approach, national forecasts for French and German Industrial Production are produced using business survey data on the manufacturing sector diffused by the European Commission. The (seasonally adjusted) balances used are those on production trend in recent months, assessment of order-book level, assessment of export order book level, assessment of stocks of finished products, production expectations for the months ahead, selling price expectations for the months ahead.

For each country, the balances are modeled as being composed of two parts, a component common to all the questions and one proper of the particular question considered; the model used to estimate the two components is a dynamic factor model. The so-extracted common factor is then used in an unrestricted VAR model that jointly describes the industrial production indices and the business indicators. For Italy, the model described above in section 4 is used.

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[5] The Centro Studi Confindustria (CSC) and IRS produce up to two months ahead forecasts of industrial production.

This indirect approach, besides giving an added value consisting in the knowledge of national forecasts, gives better results also on the aggregate euro area. The forecasting experiment is carried out on raw data, so to take into accounts revisions stemming from seasonal adjustment. Useful forecasts can be produced up to six months ahead.