A statistical overview of the economic situation in the euro area

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Abstract The paper shows how official statistics can be combined with nowcasting, high frequency estimates and composite indicators to produce a real time monitoring and an early warning system of the economic situation in the euro area.

Key words: coincident indicators, cyclical estimates, nowcasting, single factor models, temporal disaggregation

1 Introduction

The paper shows how official statistics can be combined with nowcasting, high frequency estimates and composite indicators to produce a real time monitoring and an early warning system of the economic situation in the euro area.
The paper is organized as follows: Section 2 presents a synthetic picture of methodological aspects of nowcasts of most relevant Principal European Economic Indicators (PEEIs), with the results referred to the most recent evolution of main indicators. Section 3 is devoted to EuroMIND, the euro area monthly indicator of economic activity, with a methodological overview, main extensions and most recent estimates. Section 4 concerns the system of euro area turning point detection, whereas Section 5 provides some dissemination issues and final remarks.

2 PEEIs' nowcasts obtained by a bridge modeling approach

Coincident indicators adopted by Eurostat and discussed here are based on bridge models (BM). BM aims at translating the information content of high frequency

indicators (e.g. monthly) to compute early estimates or forecasts over a short horizon of the target variable, usually available at a lower frequency (e.g. quarterly).

Application of BM starts from the following dynamic regression equation:

$$\Delta y_t = c + \sum_{i=1}^{p} \alpha_i \Delta y_{t-i} + \sum_{i=0}^{p} \sum_{j=1}^{k} \beta_{ij} x_{t-i,j} + u_t, \quad t = 1,\ldots,T \tag{1}$$

where c is an intercept, α_i and β_i the regression coefficients , p the number of lags, Δ the first-difference operator, x_{it} the predictors, and u_t a mean zero disturbance with variance σ^2.

The BM consists in a 3-step procedure: (1) x_{it} are projected over a forecast horizon by means of a univariate time series technique; (2) the indicator is temporal aggregated at the same time span of the target variable; (3) parameter estimation of model (1) is carried out to determine the coincident indicator $\hat{y}_t$ over the full sample period t=1,2, …, T. For recent reviews with applications refer to Barhoumi at al. (2008), to Baffigi et al. (2004) and Mazzi and Montana (2009).

2.1 Most recent evolution of main euro area PEEIs

The picture of the current economic situation in the euro area is improved in terms of timeliness through the forecasts provided by the coincident indicators introduced in previous section. In other words, a user looking at available statistics at mid May 2012 finds data only until February /March of 2012 or 4th quarter of 2011. This section shows how, by using nowcasting techniques, it is possible to produce a more updated picture covering also more recent periods.

In table 1 we look at the two quarterly indicators of GDP and Employment and at four monthly time series: harmonized index of consumer prices (HICP), producer price index (PPI), Unemployment and the economic sentiment indicator (ESI). Table 1 shows most recent data officially released by Eurostat for these indicators together with the nowcasts for most recent periods; in particular nowcasts are referred to the first quarter of 2012 for quarterly GDP and Employment and April 2012 for HICP, PPI. In both cases nowcasts are obtained by a bridge modelling approach.

What emerges quite clearly from table 1 it is the stagnation of the euro area economy. Concerning GDP, its quarterly growth is close to nil from the second quarter of 2011 on and it is gradually decreasing in the same quarters in terms of annual growth. Note the negative quarterly growth at end 2011 and the stagnation in the first quarter of 2012 for both the official flash estimate and the nowcasts obtained by BM.

Looking at Employment the situation is even worse considering a negative growth starting from the third quarter of 2011 and a negative annual variation nowcasted for beginning of 2012 of -0.5%. This decline is accompanied by high and constant increasing rates of unemployment closer and closer to 11% in last months.

Annual inflation in the euro area is at 2.6% in April 2012 according to the flash estimate officially released by Eurostat, down from 2.7% recorded in previous month.

Table 1: Most recent evolution of main euro area PEEIs

		2010q4	*2011q1*	*2011q2*	*2011q3*	*2011q4*	*---- 2012q1 ----*	
GDP	% (Q/Q-1)	0.3	0.7	0.1	0.1	-0.3	0.0	0.0(*)
	% (Q/Q-4)	2.1	2.4	1.6	1.3	0.7	-	0.0(*)
Employment	% (Q/Q-1)	0.1	0.4	0.2	-0.2	-0.2	-	-0.3(*)

	% (Q/Q-4)	0.1	0.6	0.7	0.6	0.2	- -0.5(*)
		2011 m11	***2011 m12***	***2012 m1***	***2012 m2***	***2012 m3***	***2012 m4***
HICP	% (M/M-1)	0.1	0.3	-0.8	0.5	1.3	0.5
	% (M/M-12)	3.0	2.7	2.7	2.7	2.7	2.6
PPI	% (M/M-1)	0.3	-0.2	0.8	0.6	0.5	0.3(*)
	% (M/M-12)	5.4	4.3	3.8	3.6	3.3	2.7(*)
Unemployment rate		10.5	10.6	10.7	10.8	10.9	-
ESI	index	93.5	92.8	93.4	94.5	94.5	92.8

(*): nowcasts obtained by a bridge modelling approach

Same decreasing pattern occurs for the PPI whose annual growth in March of 2012 is equal to 3.3% down from 3.6% of February. Its nowcast for April is 2.7%.

Negative it is also the perception of the economic situation by producers and consumers as shown by the ESI released by the European Commission. Its value is equal to 92.8 in April 2012 down of 1.7 points from March and maintaining a value well below the long term average of 100 in recent months.

In table 2 we provide a synthetic picture of GDP quarterly growth by country. Starting from Germany, the good performance of the economy from end 2010 had a stop in last quarter of 2011 of -0.2% and a recovery of 0.5% in the first quarter of 2012, well over the nowcast of 0.2%. In France the substantial stagnation of the economy over all 2011 continues at the beginning of 2012 substantially in line with the nowcast of 0.1%. In the same period Italy records a contraction of the economy significantly stronger than forecasted, -0.8% against -0.2%, and in acceleration with respect to the other two negative signs characterizing the economy from the second half of 2011. Similar it is the negative development of the economy in the second half of 2011 for Belgium and Netherlands where, in the latter case, it is recorded a further contraction in the first quarter of 2012 of -0.2% contrary to the recovery of 0.2% signalled by the nowcasts. The negative pattern also concerns Spain, -0.3% in the last two quarters and without significant differences with respect to the projections for beginning 2012;

Table 2: GDP growth by country

	2010q 4	***2011q 1***	***2011q 2***	***2011q 3***	***2011q 4***	***---- 2012q1 ----***	
Belgium	0.5	0.9	0.3	-0.1	-0.1	-	0.0(*)
Netherlands	0.8	0.7	0.2	-0.4	-0.6	-0.2	0.2(*)
Spain	0.2	0.4	0.2	0.0	-0.3	-0.3	-0.2(*)
Italy	0.2	0.1	0.3	-0.2	-0.7	-0.8	-0.2(*)
France	0.4	0.9	0.0	0.3	0.2	0.0	0.1(*)
Germany	0.5	1.3	0.3	0.6	-0.2	0.5	0.2(*)
Euro Area	0.3	0.7	0.1	0.1	-0.3	0.0	0.0(*)

(*): nowcasts obtained by a bridge modelling approach

3 EuroMIND

From 2006 onwards, we have investigated the possibility of constructing a euro area monthly indicator of economic activity as much as possible consistent with the GDP, called EuroMIND. The availability of a monthly indicator such as EuroMIND is particularly relevant to monitor the business cycle in real time. Moreover, being EuroMIND disaggregated into branches, it allows following in real time the evolution of the different elements of the euro area economy: sectors and demand components.

The main characteristics of EuroMIND (for details see Frale et al. (2011)) are the following: 1) use of a disaggregate approach represented by the output and expenditure breakdowns of the GDP at quarterly base; 2) for each component, a set of monthly indicators are selected, including both macroeconomic variables and survey answers; 3) indicators are both monthly and quarterly, modelled into the Stock and Watson single index model; 4) model casted into a state space form allowing for temporal disaggregation (for details see Harvey (1989)); 5) use of a computational efficient procedure; 6) chain-linking is taken into account; 7) final estimate obtained combining the estimates from the output and expenditure sides, with optimal weights reflecting their relative precision; 8) benchmarking to official quarterly accounts so that full consistency between monthly and quarterly estimates is achieved; 9) explicit measure of uncertainty around the indicator available.

The modelling strategy mentioned at point 3) refers to the Stock and Watson (1991) SW single index model. The fundamental idea behind this specification is to separate the dynamics which are common to a set of N coincident series, y_t, that are I(1) but not cointegrated, from the idiosyncratic component, which is specific to each series. The level specification of the SW single index model here considered expresses y_t as the linear combination of a common cyclical trend, that will be denoted by μ_t, and an idiosyncratic component, μ_t^*. Letting ϑ_0 and ϑ_1 denote N×1 vectors of loadings, and assuming that both components are stationary in first difference and subject to autoregressive dynamics, we can write:

$$y_t = \vartheta_0 \mu_t + \vartheta_1 \mu_{t-1} + \boldsymbol{\mu}_t^* + \mathbf{B}\mathbf{x}_t, \qquad t = 1, \ldots, n \tag{2}$$

$$\varphi(L)\Delta\mu_t = \eta_t, \qquad \eta_t \sim \text{NID}(0, \sigma_\eta^2), \tag{3}$$

$$D(L)\Delta\,\mu_t^* = \delta + \eta_t^*, \qquad \eta_t^* \sim \text{NID}(0, \Sigma_{\eta^*}), \tag{4}$$

where $\varphi(L)$ is an autoregressive polynomial of order p with stationary roots

$$\varphi(L) = 1 - \varphi_1 L - \ldots - \varphi_p L^p \tag{5}$$

and the matrix polynomial D(L) is diagonal:

$$D(L) = \text{diag}[d_1(L), d_2(L), \ldots, d_N(L)] \tag{6}$$

with $d_i(L) = 1 - d_{i1}L - \ldots, d_{ip}L_p$ and $\boldsymbol{\Sigma}_{\eta^*} = \text{diag}(\sigma_1^2, \ldots, \sigma_N^2)$. The vector x_t contains the value at time t of k deterministic regressors common to all the series, e.g. trading days and moving holidays regressors, and B is an N×k matrix of regression coefficients. The disturbances η_t and η_t^* are mutually uncorrelated at all leads and lags.

3.1 EuroMIND's extensions and most recent results

In order to take into account particular events for better exploiting the characteristics of EuroMIND as powerful tool for the assessment of the economic situation, several extensions have been developed or are currently under development. The first one is

the generalization of this model with better forward looking properties, bringing to the production of the EuroMIND-S indicator based on the incorporation, as a separate factor, of surveys data (for details see Frale at al. (2010)).

Results of the last release of EuroMIND and EuroMIND-S are shown in Table 3. Both the indicators show a very similar pattern so that Euro MIND-S can be used as a complement of EuroMIND to obtain more recent information. In the months of first quarter of 2012 both EuroMIND and EuroMIND-S show a very flat behaviour, confirming the stagnation of the economic growth. However, it clearly emerges the capacity of EuroMIND to provide early signals with respect to the quarterly GDP flash estimate. According to the former indicator the negative growth is signalled since September 2011 with duration of 4 months; moreover, concerning the beginning of 2012, EuroMIND is able to provide a first signal of negative annual variations starting from February 2012.

Table 3: GDP growth rates: comparison among indicators

	Quarerly GDP	***Euro Mind***	***Euro Mind-S***	***Quarerly GDP***	***Euro Mind***	***Euro Mind-S***
	variations over previous period			*variations over same period of previous year*		
Feb-11	-	0.35	0.33	-	2.66	2.59
Mar-11	0.72	0.10	0.09	2.39	2.21	2.22
Apr-11	-	0.04	0.05	-	2.12	2.07
May-11	-	-0.06	-0.08	-	1.53	1.54
Jun-11	0.15	-0.13	-0.07	1.62	1.23	1.27
Jul-11	-	0.25	0.21	-	1.38	1.39
Aug-11	-	0.14	0.09	-	1.51	1.45
Sep-11	0.15	-0.27	-0.16	1.34	1.13	1.17
Oct-11		-0.02	-0.09	-	0.96	0.96
Nov-11		-0.12	-0.10	-	0.77	0.77
Dec-11	-0.30	-0.18	-0.18	0.71	0.42	0.42
Jan-12	-	0.05	0.05	-	0.15	0.14
Feb-12	-	0.03	-0.02	-	-0.16	-0.21
Mar-12	0.00	-	0.04	-	-	-0.25

4 The system of euro area turning point detection

The Eurostat methodology for the construction of a euro area turning point (TP) chronology and a system of coincident TP indicators is the following (for details see Anas at al. (2008)):

1) simultaneous analysis of classical business cycle and growth cycle in the so called ABCD framework;
2) statistical dating of euro area TP by means of a simple non parametric dating rule;
3) comparison of euro area and member states (MS) dating;
4) preliminary investigation of alternative models for the construction of TP composite coincident indicators for classical business cycle and growth cycle, including the identification of appropriate number of regimes and related thresholds;

5) variable selection performed on the basis of the ability of a set of potential candidates series to correctly detect growth cycle TP. For each series a set of transformations is assessed in order to choose the most appropriate one. As a result, five variables have been identified as components of the growth cycle TP composite coincident indicator: Employment expectation, Construction confidence indicator, Financial situation of the last 12 months, IPI, Imports of intermediate goods;
6) construction of the growth cycle coincident indicators (GCCI) as a weighted mean of the transition probabilities returned by the five univariate two regimes Markov Switching models fitted on each variable as follows

$$GCCI_t = \frac{1}{5}\sum_{k=1}^{5} \Pr(\text{Recession})_t^k , \tag{7}$$

where $\Pr(\text{Recession})_t^k$ is the probability that the k – the component of the GCCI is in a recession of the growth cycle at time t, with $k \in \{1,2,3,4,5\}$. An equal weight averaging weighting scheme is used.
For each occurrence, the QPS and Concordance Index are computed as follows:

$$QPS = \frac{1}{T}\sum_{t=1}^{T} (P_t - RC_t)^2 , \tag{8}$$

where, for $t \in \{1,\ldots,T\}$, P_t is the filtered probability of being in recession, RC_t the TP of the reference chronology in month t and

$$CI = \frac{1}{T}\left[\sum_{t=1}^{T} I_t \times RC_t + \sum_{t=1}^{T} (1-I_t)\times(1-RC_t)\right], \tag{9}$$

where I_t is a binary random variable that assumes value 1 if the coincident indicator is in the recessionary phase of the business cycle and 0 otherwise.
7) variable selection has been performed on the basis of the ability of a set of potential candidates series to correctly detect business cycle TP. For each series a set of transformations is assessed in order to choose the most appropriate one. As a result, three variables have been identified as components of the business cycle TP composite coincident indicator: IPI, New cars registration and Unemployment rate;
8) construction of the business cycle coincident indicators (BCCI) as a weighted mean of the transition probabilities returned by the three univariate three regimes Markov Switching models fitted on each variable as follows:

$$BCCI_t = \sum_{k=1}^{3} \omega^k \Pr(\text{Recession})_t^k , \tag{10}$$

where, by analogy, the variables in (10) follow the same definitions as in (7). The resulting weights are IPI=0.34, Unemployment=0.46, New cars registration=0.20.

For both the GCCI and BCCI the threshold is set to 0.5. In other words values above/below 0.5 indicate a recession/expansionary phase.

In order to enhance the cyclical monitoring of the euro area, several initiatives have been recently undertaken. A first one concerns the extension of the cyclical monitoring also to the acceleration cycle following the αABßCD approach. A second one the construction of alternative GCCI and BCCI based on a multivariate Markov Switching approach (see Billio et al. (2011) for more details).

A picture of the Eurostat system of most recent TP is provided in table 4, with details of the provisional dating, as well as the indicators based on the multivariate approach

Table 4: Summary of most recent turning points

Economic Cycle	***Coincident indicator***	***Peak***	***Trough***	***Peak***
Acceleraion Cycle	*Provisional dating*	*2006 Q1*	*2008 Q1*	*2010 Q2*
	ACCI	June 2006	March 2009	Dec. 2010
		Dec. 2010	Dec. 2011	March 2012
Growth cycle	*Provisional dating*	*2008 Q1*	*2009 Q3*	*2011 Q1*
	GCCI	March 2007	July 2009	August 2011
	Multivariate	Dec. 2007	Sept. 2009	May 2011
Classical business cycle	*Provisional dating*	*2008 Q1*	*2009 Q2*	*2011 Q3*
	BCCI	August 2008	Oct. 2009	Jan. 2012
	Multivariate	April 2008	Sept. 2009	Dec. 2011

5 Dissemination issues and final remarks

The estimates and indicators presented in this paper are extensively based on the use of statistical and econometrics techniques which represent almost the core of the production process and not just a complement as usually in the production of official statistics. For this reason it is still an open issue if statistical agencies should be involved in such kind of activities and how they should disseminate them eventually.

The recent economic and financial crisis, as well as the difficult period characterizing the euro area economies, have clearly shown the importance of providing users with an information system ensuring an effective real-time monitoring and an early warning system of the economic situation. As shown in this paper such objectives can be achieved by complementing official statistics by statistical and econometric modelling techniques. One of the major outcomes of the series of seminars organized in the context of the UNSD and Eurostat initiative in response to the global economic and financial crisis has been the decision of preparing handbooks on rapid estimates and on cyclical composite indicators helping statistical agencies in developing such new kind of information, with a leading role by Eurostat.

Nevertheless, the role that new statistical products should play in the activities of statistical agencies and relationships between such new products and official statistics still need to be further investigated. A first attempt to clarify those aspects is presented in Baigorri, Bohata, Hahn Mazzi (2012), whose main findings follow.

First of all, new estimates and indicators like those shown in previous sections cannot be, for the time being, assimilated to official statistics but they should instead be considered more as experimental statistics or statistics under development. The rational is that they do not necessary fulfil the usual quality standards for official statistic also because they are based on a very limited data collection and they follow a non-standard production process. A new quality framework for experimental statistics needs then to be developed, taking into account their specificities and peculiarities.

The second relevant point is that, if some the indicators here presented could become, in the future, after an in-depth evaluation, part of official statistics, other indicators (such as the turning points ones) should probably stay in the field of experimental statistics even after an evaluation phase. This statement is obviously based on the current perception of the frontiers of official statistics. Since frontiers of

official statistics are evolving accordingly with users needs and expectations and statisticians ability to satisfy them; we cannot exclude that, in the future, new possibilities of inclusion of such cyclical indicators as part of official statistics could be opened. At the same time, we cannot exclude that, in the future, due to priority settings and to resources constraints, such kind of activities could be discontinued.

The third important point is that experimental statistics and statistics under development have to be disseminated in such a way to avoid any confusion with official statistics. Users, when looking or using new estimates of indicators, should clearly be aware that they are not official statistics as such and that they have to be used with particular carefulness since they do not necessary satisfy the usual quality requirements. These non-standard statistics should be fully documented and accompanied by an appropriate methodological documentation guiding to a better understanding of their generating process. They should also be accompanied by a sort of reading guide helping users to correctly understand their message and to warn them on possible drawbacks of the proposed indicators.

Finally the dissemination of new indicators as experimental statistics or statistics under development should also be the occasion to open a debate among users and methodologists on their relevance and on possible improvements. Their dissemination should be accompanied by the opening of discussion fora and blogs to stimulate the debate. The outcome will play an important role when deciding about their future and their role. For its experimental statistics and statistics under development, Eurostat considers statistics explained as an ideal platform to disseminate them.

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