

UNECE Seminar on the Role of National Statistical Offices in the Production of Leading, Composite and Sentiment Indicators

ISTAT Experience in the Compilation of an Italian Economic Sentiment Indicator

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Purposes of this presentation

- To illustrate the ISTAT experience in the elaboration of the Italian Economic Sentiment indicator (IESI).

More specifically:

- to show the data-set used, the methodologies applied, the results obtained and the evaluation criteria employed to choose the best result
- to illustrate the methodological changes which have occurred in 2015
- to present a new Italian Economic Sentiment Indicator calculated using a different methodology of multivariate analysis not originally used

Introduction

Some preliminary notes

- The ISTAT Economic Sentiment Indicator (IESI) is a synthesis of the variables that make up the confidence climate indicators of industry, construction, services and retail trade sectors. In order to reflect the confidence only the supply side, it does not include the variables of the consumer confidence indicator in its definition
- In this respect, the IESI is different from ESI, the Economic Sentiment Indicator, regularly disseminated by European Commission (for further details on ESI, one can see European Commission, 2007)
- The ISTAT worked for the development of the IESI between 2011 and early 2012. It is monthly widespread since June 2012

Italian Business and Consumer Tendency surveys

A short overview (1)

- Italy has been partner of the Harmonised European Programme of Business and Consumer Tendency Surveys since early 60s
- In Italy, the Business and Consumer tendency surveys were carried out:
 - by the Institute for Studies on Economic Cycle (ISCO) until 1997
 - by the Institute for Studies and Economic Analysis (ISAE) until 2010
 - by the Statistical Office (ISTAT) since January 2011 - *Law n°122 of 2010*
- The Italian surveys adhere to the guide lines of the European Commission for structure of samples (type and sectoral stratification), frequency (monthly) and structure of the questionnaires

Italian Business and Consumer Tendency surveys

A short overview (2)

- The sample size, the methods of collecting and compiling data and the techniques used to prepare, monitor and update the samples are aspects not fixed by any European Commission guide line
- Every month, the Italian tendency survey results are sent to the European Commission. After that, they are disseminated through the ISTAT press release “Consumer and Business Confidence” and through the data warehouse of the Institute (I.Stat)
- An information note with all the technical details is available on the ISTAT website: <http://www.istat.it/en/products/press-releases>

When and why the idea of an Italian Economic Sentiment Indicator was born

When

- In January 2011, exactly when the conduction of the Italian Business and Consumer surveys passed from ISAE to ISTAT

Why

- To answer the empirical need to dispose of a synthetic measure of the Italian business confidence able to provide timely and frequent information on the evolution of the Italian economic activity at the aggregate level

What was done to elaborate the IESI (1)

The data-set description

- Altogether, 11 seasonally adjusted (with TRAMO SEATS method) series made up the data-set. More specifically:
 - the 3 series that make up the manufacturing confidence indicator,
 - the 2 series that make up the construction confidence indicator;
 - the 3 series that make up the services confidence indicator;
 - the 3 series that make up the retail trade confidence indicator;
- The analysis was performed on the data available in April 2012, and so the data-set covered the historical period between January 1992 and December 2011

What was done to elaborate the IESI (2)

The construction methodology

- First of all, the seasonally adjusted series included in the data-set were standardized
- After that, the economic sentiment indicator was initially calculated following an average based approach and, subsequently, a factor based approach. In particular:
 - In the first case, four different confidence indicators were elaborated using alternatively four different kind of weights
 - In the second case, two confidence indicators were obtained applying alternatively the principal component analysis and the static factorial analysis
- So doing, all in all we obtained six potential sentiment indicators

The average based indicators (1)

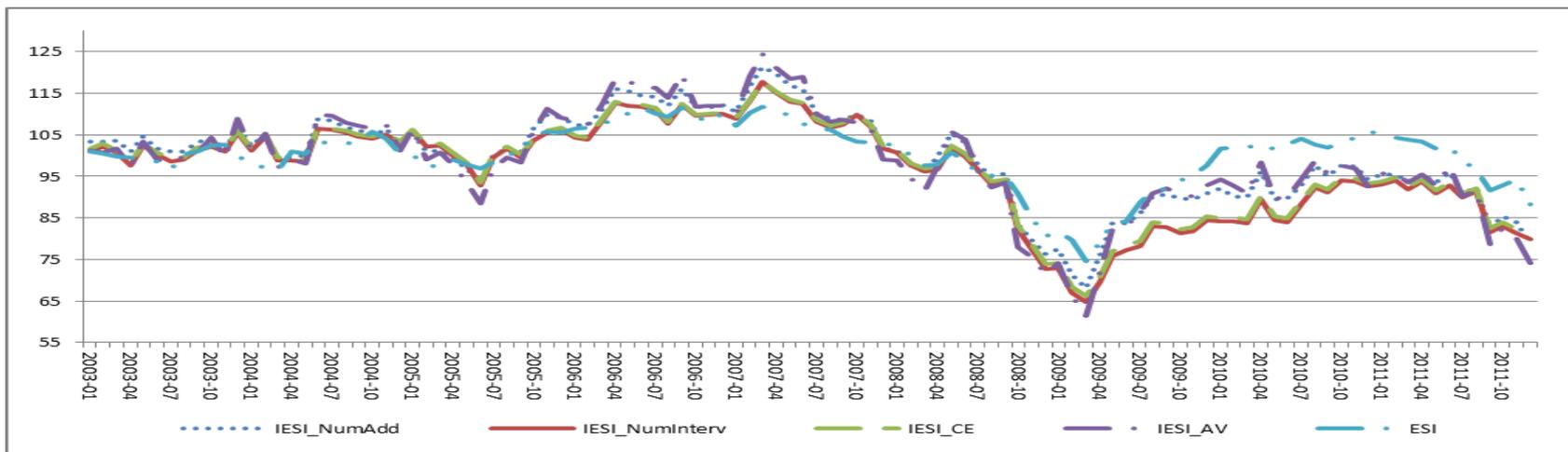
The sector weights

- It was decided to allocate four different sector weights, alternatively:
 - the total number of employees of the companies interviewed (average number in 2010) (ISTAT_Numadd);
 - the total number of interviews conducted for each survey (average number in 2010 (ISTAT_NumInterv);
 - the weights applied by European Commission in the ESI calculation (IESI_CE);
 - the Value Added pertaining to each economic sector. The letter was calculated net of the economic sectors that are not included in the domains of observation of each survey (average values in 2010) (IESI_VA)

The average based indicators (2)

The unit weights

- Lastly, to calculate the weighted averages the sector weights were divided by the number of the variables included in each confidence indicator definition
- The graph shows the evolution of the four so-obtained average based indicators as well as the Economic Sentiment Indicator calculated by the European Commission (ESI). Period: January 2003-December 2011



The factor based indicators (1)

The principal component analysis outcome

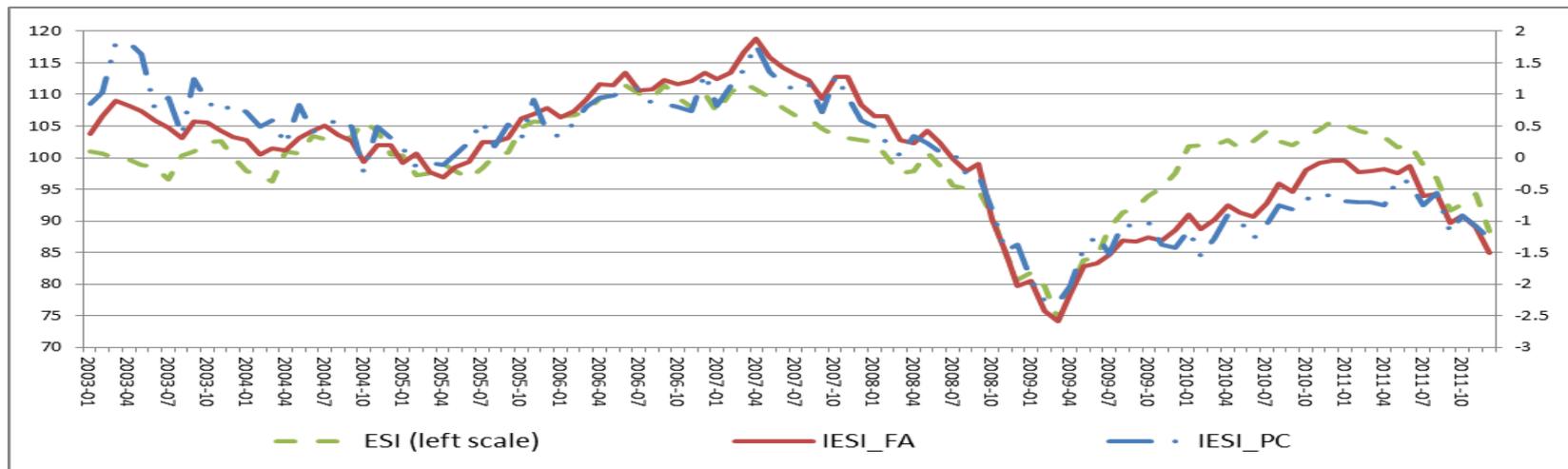
- It allowed the identification of eleven components. The indicator was actually constructed by taking the first two components.
- The first component explained 53% of the total variance; the second one 23%. In cumulative terms they explained 76%.
- Following the OECD methodology (OECD, 2008), the components identified were aggregated in a single one. After that, the indicator was calculated as a weighted average, using the loadings of the new-obtained component as weights (IESI_PC)

The factor based indicators (2)

The static factor analysis outcome

- It allowed the identification of only one common factor able to explain 50% of the total variance. As a consequence, the indicator was constructed by weighting the variables of the initial data-set with the loadings of this factor (IESI_FA)

- The following graph compares the two factor based indicators with the Economic Sentiment Indicator (ESI). Period: January 2003-December 2011



The performance evaluation (1)

The reference series

- Italian GDP and, alternatively, the Italian Value Added (both seasonally adjusted)
- The monthly frequencies of the indicators were converted into quarterly frequencies before comparing them with the reference series
- Before proceeding with the performance evaluation, the trend component of the reference series was estimated using:
 - first, the Hodrick-Prescott filter
 - second, the Christiano-Fitzgerald asymmetric filter
 - third, the fourth logarithmic differences

The performance evaluation (2)

Comparisons and tests

- All in all, six potential confidence indicators and two different reference series, each one filtered applying three different methodologies in turn

Potential confidence indicators	Reference series	Filters
First average based indicator Second average based indicator third average based indicator Fourth average based indicator First factor based indicator Second factor based indicator	Italian GDP Italian Value Added	Hodrick-Prescott Christiano-Fitzgerald (asymmetric) The fourth differences of logarithms

- The relationship between each confidence indicator and each reference series was checked looking at, in particular (Moore and Shiskin, 1967):
 - the time consistency;
 - the economic significance;
 - the directional coherence;
- Moreover, to test the forecasting abilities of the all indicators, were used:
 - the Granger test
 - the out-of-sample test (Theil inequality coefficient)

The synoptic table of the results

	CF_ASYMM_GDP			HP_GDP			DIF_TEND_GDP		
	Time consistency	In sample	Out sample	Time consistency	In sample	Out sample	Time consistency	In sample	Out sample
IESI_AV	++	-	++	++	++	+	++	+	+
IESI_CE	+	-	++	+	+	+	-	++	+
IESI_NumAdd	++	-	++	++	+	+	-	+	+
IESI_NumInterv	+	-	++	+	++	+	-	++	+
IESI_FA	++	-	++	-	++	+	-	+	-
IESI_PC	++	-	++	-	-	+	+	-	-

	CF_ASYMM_AV			HP_AV			DIF_TEND_AV		
	Time consistency	In sample	Out sample	Time consistency	In sample	Out sample	Time consistency	In sample	Out sample
IESI_AV	++	-	++	++	+	+	+	-	+
IESI_CE	+	-	++	-	+	+	-	++	+
IESI_NumAdd	++	-	++	+	+	+	-	-	+
IESI_NumInterv	+	-	++	-	++	+	-	++	+
IESI_FA	++	-	++	+	+	-	-	+	-
IESI_PC	+	-	++	-	-	+	-	-	-

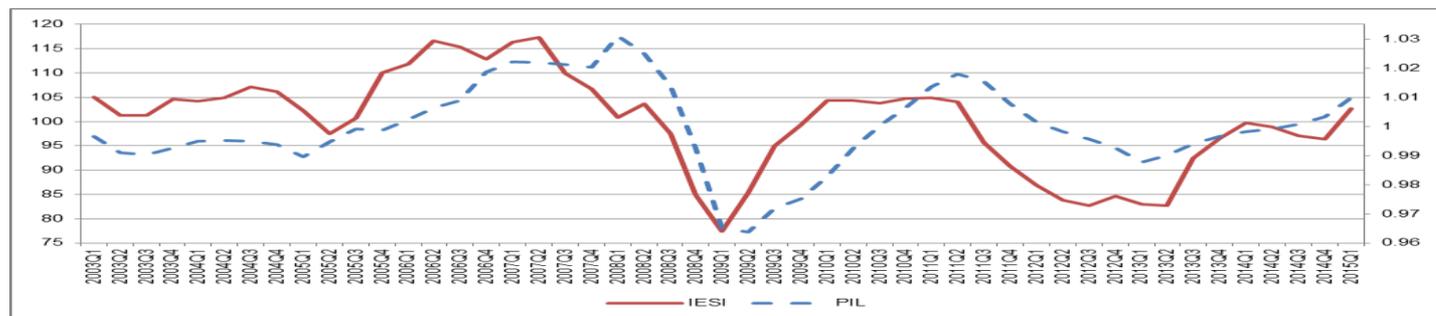
Where:

- time consistency: “++” indicator able to anticipate more than one quarter the reference series; “+” less than one quarter the reference series; “-“ indicators unable to anticipate the reference series;
- in sample forecasting capabilities: “++” refusal of the null hypothesis of non-causality for $\alpha=1\%$; “+” refusal of the null hypothesis for $\alpha=5\%$; “-“ rejection of the null hypothesis;
- out sample forecasting capabilities: “++” for a Theil value up to 0.1; “+” for a Theil value from 0.1 to 0.4; “-“ for a Theil value upper to 0.4.

The ISTAT Economic Sentiment Indicator

The test results

- The confidence indicator IESI_VA compared to the GDP series filtered with the Hodrick-Prescott method appeared to be characterised by the best performance one among all. It was called ISTAT Economic Sentiment Indicator, IESI in short
- It turned out to be characterized by: a good contemporary cross-correlation (0.66), a quite high maximum correlation one quarter in advance (0.77); a quite good score of directional coherence (0.620); a global leading ability (-1.4; -1.8 at the peaks); the ability to «Granger-cause» the reference series and, finally, an acceptable forecasting out-of-sample ability



The recent methodological review of the IESI

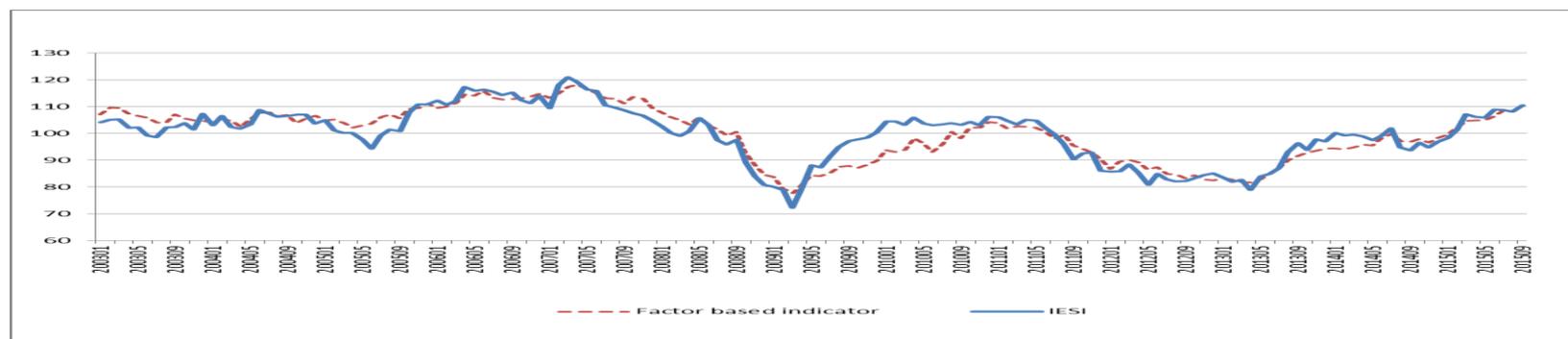
The updating of the sector weights

- In 2014, ISTAT updated both the weights used in the balance series calculation and the bases of all consumer and business confidence indexes. Coherently, also the weighting system used to calculate the IESI indicator and the base of the IESI index was updated
- Before the revision, the weighting system used for the IESI calculation was based on Value Added estimates of year 2010. These weights were stemmed from the ISTAT National Accounts.
- After the revision, the weighting system is based on data of Value Added in 2012. The values are derived from the new source called FRAME SBS (Structural Business Statistics)

A new factor based sentiment indicator

Preliminary results

- A model of dynamic factor analysis has been applied to the time series of balances (conveniently standardized) included in the IESI. The time–span considered is 2003, January - 2015, September
- The estimated time series of the underlying trend has been standardized (mean equal 0 and standard deviation 1). To make the factor based indicator comparable to IESI, it has been become to have a long term average of 100 and a standard deviation of 10
- The new factor based indicator and the IESI are shown in the following graph



The performance evaluation of the new factor based indicator

- The performance of the indicator obtained from the dynamic factor approach in tracking the Italian GDP has been evaluated according to the criteria already used previously
- With respect to the reference series, it seems to be characterized by: a very high directional coherence (85%), a quite good ability to lead the peaks of the reference series (-1.3) and yet, a very high (only) contemporaneous correlation coefficient (0.83).
- The Granger test led to a decisive refusal of the hypothesis of non-causality between the indicator and the reference series and the Theil inequality coefficient showed quite good out-of-sample forecasting properties of the indicator (0.083 the total value, 0.039 the bias, 0,014 the variance and 0,946 the covariance)

References

- European Commission. 2007. A User Manual to the Joint Harmonised EU Programme of Business and Consumer surveys. Methodological User guide. Brussels: Directorate-General for Economic and Financial Affairs.
- Moore G.H., Shiskin J. 1967. Indicators of business expansions and contractions. UMI.
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