

11th CEIES Seminar EU Short Term Economic Indicators: Meeting New Needs

Part 1 - Current situation

**Presentation of Mr Gian Luigi Mazzi, Eurostat A6
«European short-term statistics: the state of the art»**



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It can be accessed through the Europa server (<http://europa.eu.int>).

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EUROPEAN SHORT-TERM STATISTICS: THE STATE OF THE ART

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ABSTRACT

In the recent past, Eurostat action focused essentially on structural and well-harmonised figures for the European Union. After the introduction of the Euro, the situation changed considerably following the request of the European Central Bank, DG ECFIN and other institutional and non-institutional users.

Short-term statistics now represent the first Eurostat priority and different options have been made in order to supply users with a wide range of statistics able to give a general overview of the economic behaviour of both Euro-zone and EU-15 as well as all Member States.

The Euro indicators web site and the Euro-SICS (statistical indicator common site) database represent main realisations from Eurostat in the field of short-term statistics.

An analysis of the availability of short-term information evidenced some problems related to: lack of timeliness, unavailability of long time series and difficulties in the construction of European totals.

Statistical actions launched by Eurostat to improve availability and timeliness of short-term statistics will be described in some detail in this paper. In particular, we have concentrated our attention on the Euro-SICS project and on a detailed analysis concerning official short-term statistics.

Euro-SICS is actually intensively used by a number of institutional users and is continuously improved. The Euro-SICS quality is monitored by a number of synthetic parameters defined in the framework of a specific study made by Eurostat.

EUROPEAN SHORT-TERM STATISTICS: THE STATE OF THE ART

By
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1. Introduction

Initially, the main statistical activity of Eurostat was devoted to the harmonisation of national statistics based on a set of legal acts covering different areas. These legal acts were essentially concerned with structural statistics, and accuracy rather than timeliness was the keyword of Eurostat's action. This approach was completely justified by the need to support relevant political decisions such as the attribution of structural funds, regional and agricultural policy, etc. Short-term statistics were considered to be a useful complement to the structural statistics, even if, from the end of 1980s the situation gradually started changing.

The adoption of the Euro has completely changed this situation. Eurostat is now concentrating on the needs of users, the principal one being the ECB. To this view, it was requested to improve concepts such as timeliness and reliability in short-term statistics for purposes of monetary policy and, more generally, for monitoring the Euro zone. In addition, financial market analysts also focused their attention on Eurostat data, their comments, critiques and remarks are a helpful benchmark useful for the improvement of the quality of short-term statistics.

Eurostat was able to quickly change its attitude by promptly producing (in less than 1 year) a set of projects such as the implementation of the Euro-indicators web site or the Euro-SICS database. Now, it is possible to affirm that short-term statistics are the first priority of Eurostat. The situation is positively evolving but many relevant problems have still to be solved (i.e. timeliness, availability of long time series, etc.). All the European Statistical System is required to make an effort concerning short-term statistics in order to improve the availability and the quality.

Eurostat, has a doubly challenging mission in short-term statistics:

- To provide users with a complete set of reliable short-term indicators for Member States as well as for the Euro-zone and the European Union.
- To help economic policy/decision makers as well as short-term economic analysts by focusing on main macroeconomic indicators in order to provide quasi-real time data estimates and high quality statistical analysis.

Euro-SICS is intended to answer to the first category of needs, whilst the Euro-TREND site, still in preparation, will try to answer to the second one.

Clearly some topics such as backward calculation, construction of proxies for some unavailable indicators etc. are common between Euro-SICS and Euro-TREND, so that Euro-SICS must be able, in the coming times, to incorporate new statistical features produced and tested in the context of Euro-TREND.

The aim of this paper is to provide a synthetic view of the actual situation. It considers Eurostat projects and problems we are confronted with. The structure of the paper is as follows:

- Section 2 will present the Euro-SICS database and its development;
- Section 3 is devoted to the statistical analysis of Euro-SICS, whereas;
- Section 4 presents the process of harmonisation of short-term statistics, and;
- Section 5 contains some synthetic conclusions.

2. Euro-SICS

Euro-SICS supplies institutional users with a wide range of short-term indicators for both Euro-zone and the European union as well as for Member States. It is an extension of the Euro-indicators web site developed by Eurostat in 1998 and currently available to the public. The project was launched at the beginning of 1999 and the beta version of this site was presented in July 1999 during the first Euro-SICS working party. Thanks to a strong action from the Eurostat Management Committee and the Statistical Programme Committee, the site was opened to users at the end of last year.

2.1 General aspects

The series included were selected according to economic and statistical criteria in order to give an accurate picture of the short-term economic situation. Particular attention in the identification of the series was given to their relationships (leading-lagging structure) as well as to their utilisation in the construction of other aggregates (macroeconomic ones). Quarterly national accounts were considered the centre of this exercise and the usefulness of other short-term indicators in explaining the evolution of quarterly account aggregates has been evaluated.

The indicators to be included in Euro-SICS have been classified into 3 main categories:

- fully harmonised;
- national, generally available;
- country specific.

The first two categories are under the responsibility of Eurostat, the third one is under the responsibility of Member States. Fully harmonised data and national data are available on Euro-SICS, country specific indicators are not yet defined by Member States. Euro-SICS is today composed of 56 main indicators. Taking into account different breakdowns, the total number of indicators is about 450. Euro-SICS is organised into 11 domains. Table 1 below shows main Euro-SICS indicators by domain.

Two additional domains are currently in preparation: labour force surveys (quarterly) and short-term qualitative surveys (monthly and quarterly).

In order to be really interesting for short-term analysts and policy-makers, Euro-SICS must progressively achieve the following objectives, which are judged by Eurostat as “conditio sine qua non” for the success of the project:

- to be quasi real-time updated
- to contain long time-series
- to be fully documented
- to be continuously improved

Starting from this year, Eurostat is periodically monitoring the state of Euro-SICS. In this way it is possible to follow-up the process of achievement for the Euro-SICS objectives and to improve the quality and the reliability of the site. In the following sections we will present a synthetic view of the actual state of Euro-SICS mainly based on the main requirements of the project.

Tab. 1: Euro-SICS classification scheme

Domains	Indicators	Breakdown 1	Breakdown 2
Balance of payments (quarterly)	Trade in Goods	Credit/Debit/Net	Extra EUR11/ EU15/ R.o.w.
	Trade in Services	Credit/Debit/Net	Extra EUR11/ EU15/ R.o.w.
	Transportation	Credit/Debit/Net	Extra EUR11/ EU15/ R.o.w.
	Travel	Credit/Debit/Net	Extra EUR11/ EU15/ R.o.w.
	Income Flow	Credit/Debit/Net	Extra EUR11/ EU15/ R.o.w.
	Compensation of Employees	Credit/Debit/Net	Extra EUR11/ EU15/ R.o.w.
	Investment income	Credit/Debit/Net	Extra EUR11/ EU15/ R.o.w.
	Current transfers	Credit/Debit/Net	Extra EUR11/ EU15/ R.o.w.
	Current and Capital account	Credit/Debit/Net	Extra EUR11/ EU15/ R.o.w.
	Energy (monthly)	Consumption	Electrical /Total
Production		Electrical /Total	-
Imports		Electrical /Total	-
External trade (monthly)	Exports	STC (7commodities group)	Extra EUR11/ EU15/ R.o.w.
	Imports	STC (7commodities group)	Extra EUR11/ EU15/ R.o.w.
Industry (monthly)	Industrial order index	Nace Rev1 (14 industries)	
	Industrial production index	Nace Rev1 (29 industries)	
	Industrial turnover index	Nace Rev1 (25 industries)	
	New car registration	-	
Labour Cost (quarterly)	Conventional earnings index	Industry whole economy	
	Labour cost index	NACE Rev 1(6 industries)	
Employment (monthly & quarterly)	Employed persons	Total Industry and construction	
Monetary and Financial Indicators (monthly)	Money Supply	M1, M2, M3	
	Interest rates	3 months / long term gov.ment yield	
	Euro yield maturity rates	1/ 5/ 10 years	
	Stock market capitalisation	-	
Prices (monthly)	Harmonised price index	Coicop (18 commodity groups)	
	National consumer price index	-	
Retail sales (monthly)	Producer price index	NACE Rev1 (38 industries)	
	Retail sales turnover	NACE Rev1 (6 industries)	
	Retail sales volume index	NACE Rev1 (6 industries)	

Tab. 1 (follows): Euro-SICS classification scheme

Domains	Indicators	Breakdown 1	Breakdown 2	
National Accounts (quarterly)	Gross Value Added	(6 main industries)		
	Financial intermediation services indirectly measured (FISIM)	-		
	Taxes	Net taxes - subsidies		
	Gross Domestic Product	-	-	
	Final Consumption	Sector (households nkish and general government)	Actual/expenditure	
	Gross capital formation	-	-	
	Gross Fixed Capital Formation	NACE Rev 1 (6 products)	-	
	Inventory Changes	With / without valuables		
	Acquisition less dispositions of valuables	-		
	Exports	Goods / Services/Total		
	Imports	Goods / Services/Total		
	External Balance	Goods / Services/Total		
	Primary income	Payable to / receivable from the rest of the world		
	Consumption of fixed capital	-		
	National Income	Gross/net		
	Disposal Income	Gross/net		
	National Saving	Gross/net		
	Capital transfers	Payable to / receivable from the rest of the world		
	Acquisition less dispositions of non financial - non produces assets	-		
	Net Lending or Borrowing	-		
	Compensation of Employees	NACE Rev 1(6 industries)		
	Gross Wages and Salaries	NACE Rev 1(6 industries)		
	Gross operating surplus and mixed income	NACE Rev 1(6 industries)		
	Population	Total/ active		
	Employment	NACE Rev 1(6 industries)		
	Unemployment (monthly)	Unemployment (ILO)	Men/ women/ total	Over / under 25 years / total

2.2. Coverage

The 56 main indicators define a theoretical number of 15,000 time-series that should be in Euro-SICS. Unfortunately not all the countries are able to provide the requested indicators. Table 2 shows the distribution between active series (regularly updated), non-active ones (not updated during the last 12 months) and missing series (non-computed by Member States or by Eurostat due to a lack of information).

Table 2: Number of time series in the Euro-SICS database by domains and state (as of 25/07/2000)

Series Domain	Missing		Active		Inactive		Total	
	N	%	N	%	N	%	N	%
Balance of Payments	630	57.1	459	41.6	15	1.4	1104	100
Energy	.	.	90	100	.	.	90	100
External Trade	20	5.8	304	88.9	18	5.3	342	100
Industry	482	20.7	1727	74.2	120	5.2	2329	100
Labour Cost	17	12.5	105	77.2	14	10.3	136	100
Employment, Construction, M	.	.	16	100	.	.	16	100
Employment, Construction, Q	.	.	26	86.7	4	13.3	30	100
Employment, Industry, M	26	5	478	91.6	18	3.4	522	100
Employment, Industry, Q	143	14.5	700	71	143	14.5	986	100
Monetary and Financial Indicators	77	37.7	65	31.9	62	30.4	204	100
National Accounts	4054	60.5	2497	37.3	147	2.2	6698	100
Prices	261	22.9	726	63.7	153	13.4	1140	100
Retail sales Index	782	60.3	306	23.6	208	16	1296	100
Unemployment	.	.	144	94.7	8	5.3	152	100
Total	6492	43.2	7643	50.8	910	6	15045	100

Since Euro-zone and EU-15 totals are obtained by starting with Member States figures, it is clear that European totals suffer, particularly due to the lack of national information especially when this concerns main countries. Table 3 below presents the distribution of active series by domain and frequency.

Tab. 3: Distribution of series in the Euro-SICS database by domain and frequency

Frequency Domain	Yearly	Quarterly	Monthly	Total	
	N	N	N	N	%
Balance of Payments	.	474	.	474	5.5
Energy	.	.	90	90	1.1
External Trade	.	.	322	322	3.8
Industry	.	.	1847	1847	21.6
Labour Cost	.	119	.	119	1.4
Employment, Construction, M	.	.	16	16	0.2
Employment, Construction, Q	.	30	.	30	0.4
Employment, Industry, M	.	.	496	496	5.8
Employment, Industry, Q	.	843	.	843	9.9
Monetary and Financial Indicators	.	.	127	127	1.5
National Accounts	.	2644	.	2644	30.9
Prices	.	.	879	879	10.3
Retail sales Index	46	127	341	514	6
Unemployment	.	.	152	152	1.8
Total	46	4237	4270	8553	100

Table 3 shows clearly that the majority of series are available on monthly basis. Annual data is available only for retail sales due to the unavailability of high frequency data for some countries. Improvements could be made for balance of payments (monthly data are already available in many countries and also for the Euro-zone) and national accounts (the estimation

of a monthly indicator of GDP is now considered by many countries). Eurostat is also working on this direction (see Ladiray and Mazzi).

2.3. Availability of long times series

One of the main requirements from the users of short-term statistics is their availability over a fairly long time-period. Short series are completely useless for analytical purposes. A minimum requirement in terms of length can be identified in the possibility of covering at least two economic cycles. In other words, time-series should be available over a period of about 15 years. Clearly for econometric modelling or for analysis based on non-linear techniques, longer time-series should be needed.

The following table presents the actual distribution of time-series in Euro-SICS by length and domain.

Tab.4: Distribution of series in the Euro-SICS database by domain and length

Length of the series	less than 1 year		from 1 year to less than 5 years		from 5 years to less than 10 years		from 10 years to less than 15 years		15 years and more		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
Balance of Payments	.	.	45	9.8	30	6.5	.	.	384	83.7	459	100
Energy	25	27.8	65	72.2	90	100
External Trade	.	.	36	11.8	14	4.6	168	55.3	86	28.3	304	100
Industry	.	.	71	4.1	353	20.4	574	33.2	729	42.2	1727	100
Labour Cost	82	78.1	11	10.5	12	11.4	105	100
Employment, Construction, M	6	37.5	4	25	6	37.5	16	100
Employment, Construction, Q	6	23.1	10	38.5	10	38.5	26	100
Employment, Industry, M	.	.	38	7.9	114	23.8	94	19.7	232	48.5	478	100
Employment, Industry, Q	.	.	37	5.3	192	27.4	183	26.1	288	41.1	700	100
Monetary and Financial Indicators	.	.	20	30.8	5	7.7	21	32.3	19	29.2	65	100
National Accounts	.	.	41	1.6	843	33.8	164	6.6	1449	58	2497	100
Prices	.	.	10	1.4	227	31.3	232	32	257	35.4	726	100
Retail sales Index	.	.	29	9.5	115	37.6	138	45.1	24	7.8	306	100
Unemployment	32	22.2	8	5.6	104	72.2	144	100
Total			327	4.3	2019	26.4	1632	21.4	3665	48	7643	100

Table 4 shows how far along the objective of long time-series in Euro-SICS is. All Member States have to go through the European Union's regulations and directives to accelerate the process of back-recalculation of their data (see section 4). At the same time, back-recalculation of Euro-zone figures is a Eurostat priority (see Ladiray and Mazzi).

2.4. Timeliness

This requirement is judged by many users to be a first priority. If the information becomes available not in real time, its usefulness is considerably reduced. For the first time, the need for timeline short-term statistics was addressed by the Statistical Program Committee in the context of a joint initiative with the European Monetary Institute (now ECB). In this initiative, Eurostat was required to supply to the EMI about 50 main economic indicators no later than 24 hours after their national publication. The same principle has been adopted in Euro-SICS and there is a strong recommendation to Member States and to Eurostat producers for the respect of this principle (same day delivery). Even if the situation has improved in the last few years, it cannot be judged satisfactory. In addition, it must be stressed that it is very difficult to test this requirement with the information at present available on Euro-SICS. The following table displays the maximum of information currently available from Euro-SICS on this topic.

Tab. 5: Distribution of series within the Euro-SICS database by frequency and delay in number of days

Delay of the series	Under 30 days		From 30 days to less than 60 days		From 60 days to less than 90 days		From 90 days to less than 180 days		Over 180 days		Total	
Frequency	N	%	N	%	N	%	N	%	N	%	N	%
1	.	.	.	.	.	.	.	.	46	100	46	100
4	2	0	27	0.6	478	11.3	2625	62	1105	26.1	4237	100
12	409	9.6	1462	34.2	1095	25.6	668	15.6	636	14.9	4270	100
Total	411	4.8	1489	17.4	1573	18.4	3293	38.5	1787	20.9	8553	100

Concerning delays, we have to distinguish between 2 measures:

The first one concerns the timeliness of the publication of national and European series with respect to the reference period. The second one is the delay between the publication of data and its updating in Euro-SICS (ideally, this second value should be always 0).

Unfortunately, in Euro-SICS it is currently impossible to distinguish between the 2 measures listed above and the only one we are able to supply is the delay between the reference period and the last update of the database. It is important to improve this measure in order to be able to monitor more accurately this important requirement. Anyway, it is clear that timeliness of data should be improved. This problem will be analysed in more detail in section 4.

2.5. Documentation

In order to help users reach a better understanding of which data they want to use, it is important to provide a clear and complete set of metadata related to each indicator or to a family of indicators. In this view, Eurostat decided to adopt the IMF standard (SDDS). By using SDDS format, it is possible to supply all administrative and methodological information related to a particular category of data.

In the first step, Eurostat concentrated its attention on Euro-zone and EU-15 aggregates. Table 6 shows the availability of administrative information (base pages) and methodological ones (summary methodological pages) for European aggregations.

Table 6: European Metadata as of July 25, 2000

Table	Subject	Basic Info	Dissemination format	Summary Method	Release Calendar
c_na_q	National Accounts - quarterly	e_sics	E_sics	e_sics	web-site
c_mf_m	Euro Bond Yields - monthly	e_sics	E_sics	e_sics	web-site
	Stock Market Capitalisation - monthly	e_sics	E_sics	e_sics	web-site
	Money Supply - monthly	e_sics	E_sics	e_sics	web-site
	3-month Interest Rates - monthly	e_sics	e_sics	e_sics	web-site
	Long-term interest rates - monthly	e_sics	e_sics	e_sics	web-site
c_bp_q	Balance of Payments - quarterly	e_sics	e_sics	e_sics	web-site
c_et_m	External Trade - monthly	e_sics	e_sics	e_sics	web-site
c_pr_m	Harmonised Price Indices - monthly	e_sics	e_sics	e_sics	web-site
	Producer Price Index - monthly	e_sics	e_sics	e_sics	web-site
c_ip_m	Industrial Production Index - monthly	e_sics	e_sics	e_sics	web-site
	Industrial Orders Index - monthly	e_sics	e_sics		web-site
	Industrial Turnover Index - monthly	e_sics	e_sics	2nd draft	web-site
	New Car Registrations - monthly	e_sics	e_sics		web-site
c_se_m	Retail Sales Index - monthly	e_sics	e_sics	e_sics	web-site
c_lmi_m	Employment in Industry - monthly	e_sics	e_sics	e_sics	
c_lmi_q	Employment in Industry - quarterly	e_sics	e_sics	e_sics	
c_lmc_m	Employment in Construction - monthly	e_sics	e_sics	e_sics	
c_lmc_q	Employment in Construction - quarterly	e_sics	e_sics	e_sics	
c_lc_q	Conventional Earnings Indices - quarterly	e_sics	e_sics	e_sics	web-site
	Labour Cost Index - quarterly	e_sics	e_sics	e_sics	web-site
c_un_m	Unemployment - monthly	e_sics	e_sics	e_sics	web-site
c_en_m	Energy - monthly	e_sics	e_sics	e_sics	

E-sics: file available in NewCronos/theme1/euro-sics

Web-site: info available through the web-site (hyperlink from "basic info")

2nd draft: draft document, revised and sent back to the domain manager for validation

As it is possible to notice, all basic information is available in Euro-SICS whilst summary methodological ones are missing or not yet finalised for 'new car registration' and 'industrial turnover'. 'New industrial orders' is also missing due to the fact that at this time it is impossible to compile Euro-zone and EU-15 totals.

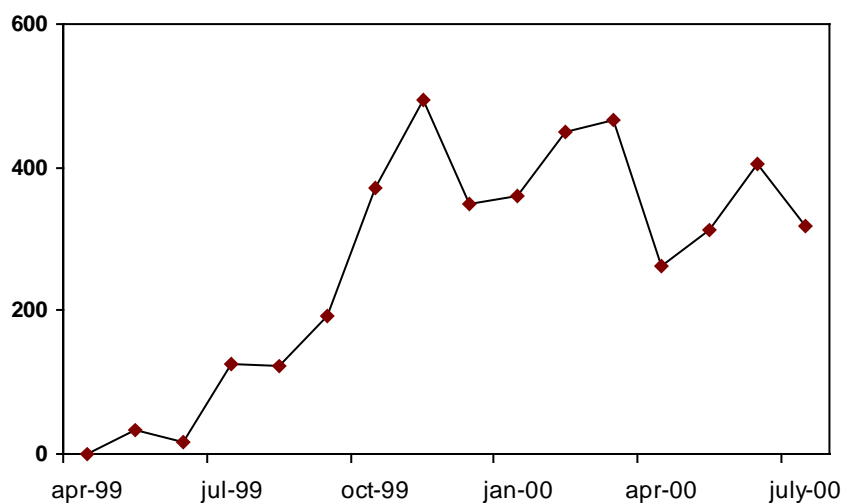
The next step through a complete documentation of the Euro-SICS site is represented by the compilation of the same pages for national series. In this context it is planned to use information already sent by Member States to the IMF integrated with all methodological information available at Eurostat and, where needed, at the OECD in the main economic indicators database. By contrast, for so-called country specific indicators, metadata in SDDS format should be directly supplied by Member States.

2.6 Dissemination

Euro-SICS is actually opened to a restricted number of privilege users including national statistical institutes, national central banks, the ECB, DG ECFIN of European Commission and other institutional users agreed by Member States, international organisations such as the IMF and OECD. At this time there are about 200 agreed users.

Figure 1 below gives an idea of the number of monthly extractions from the Euro-SICS database

Fig. 1 Evolution of the number of extractions from the Euro-SICS database



It is possible to see how the number of extractions is continuously increasing which shows a greater interest from the privilege users in this product.

Euro-SICS is now available both in the New-Cronos environment as well as on the Circa one, where a "Euro-SICS interest group" has been created. Figure 1 above takes into account only New-Cronos consultations.

Euro-SICS is not a Eurostat product but one from the European Statistical System. Eurostat and the Member States agreed on the possibility to open Euro-SICS to the public by the end of the year. A final decision on the structure of the new Euro-SICS site will be taken soon. This will be an important result because if Euro-SICS can contribute to the activity of research institutes, universities, financial market, analysts, etc. comments, critiques and suggestions from those users will be very useful for continuously improving the quality and the reliability of the database.

Moreover this new public site could be viewed as a reference one for all short-term analysts interested in Euro-zone.

3. Statistical analysis of Euro-SICS

Euro-SICS is quite a large database that currently holds more than 8,000 time series. In this situation it appears clearly that a strategy is needed to assess the statistical quality of the indicators.

3.1. Data mining

Generally, data mining (sometimes called data or knowledge discovery) is the process of analysing data from different perspectives and summarising it into useful information - information that can be used to increase quality reliability and knowledge about data. Data mining offers a number of analytical tools for analysing data. It allows users to analyse data from many different dimensions or angles, categorise it, and summarise the relationships identified. Technically, data mining is the process of finding correlations or patterns among dozens of fields in large relational databases.

Data mining techniques can be used to test the internal consistency of time series. In particular it will be very useful to detect time series that demonstrate “strange behaviours”: curious growth rates, important revisions, missing values, outliers, etc.

In this view it will be also of crucial importance to assess a sort of "cross-series consistency" in order to verify if indicators, which are intended to measure same or similar economic phenomena, give a coherent picture. To investigate the reasons of univariate or multivariate inconsistencies and to solve or explain them is an essential task to be accomplished to improve the usefulness of Euro-SICS. Table 7 shows for a specific time series of Euro-SICS some information, which can be extracted by using data mining techniques.

Table 7: Univariate data mining

Series	Electrical energy consumption in GWh – NSA
Euro-SICS name	en_ece_mua_voi_eurozone
nobs	120
valmanq	0
periode	12
mean	145398
var	215001788
min	111831
max	181899
TRAMO-SEATS model	(0,1,2)(0,1,1)
X12-ARIMA model	(0 1 2)(0 1 1)
Identifiable seasonality	yes
Trading-day effect	0
Easter effect	0
Level shift	0
Transitory change	0
Additive outlier	FEB91

Data mining software analyses relationships and patterns in stored statistical data based on open-ended user queries. Generally, any of four types of relationships are sought:

- Classes: Stored data is used to locate data in predetermined groups.
- Clusters: Data items are grouped according to logical relationships or consumer preferences.
- Associations: Data can be mined to identify associations.
- Sequential patterns: Data is mined to anticipate behaviour patterns and trends.

More sophisticated tools for analysis of Euro-SICS database could be envisaged such as Artificial neural networks: Non-linear predictive models that learn through training and reasonable biological neural networks in structure.

Genetic algorithms: Optimisation techniques that use processes such as genetic combination, mutation, and natural selection in a design based on the concepts of natural evolution.

Decision trees: Tree-shaped structures that represent sets of decisions. These decisions generate rules for the classification of a dataset.

Rule induction: The extraction of useful if-then rules from data based on statistical significance.

Data visualisation: The visual interpretation of complex relationships in multidimensional data. Graphics tools are used to illustrate data relationships.

Since data mining can be dealt with in its extended version with both data and metadata, it is also possible to envisage its use in this particular field.

3.2. Analysis of revisions

Time series of revisions must be tested in order to discover if they show any systematic behaviour. Eurostat is attaching significant importance to this type of analysis.

In chapter 15 of the Handbook of quarterly national accounts (Eurostat, 1999) a strategy for the analysis of revisions is described. This strategy can be generalised for all types of series other than national accounts. The proposed approach derives from the studies of Patterson (1992), Di Fonzo, Pisani and Savio (1994) and many others.

The analysis of revisions is structured in two steps:

- statistical analysis
- econometric analysis.

3.2.1 Statistical analysis of revisions

Summary statistics can be used for various comparisons between preliminary and final estimates. In chapter 15 of the Handbook of quarterly national accounts (Eurostat, 1999) two types of errors are considered:

- relative errors, giving information on the accuracy of preliminary estimates of levels
- absolute errors, used to evaluate the accuracy of preliminary growth rates.

Proposed indices of accuracy of the preliminary estimate of levels are:

- i) Mean relative error
- ii) Mean absolute relative error
- iii) Standard deviation of the relative error
- iv) Square root of the mean quadratic relative error
- v) Bias component of the mean quadratic relative error.

Proposed indices of the accuracy of the preliminary growth rates are:

- 1) Mean error
- 2) Mean absolute error
- 3) Standard deviation of the absolute error
- 4) Square root of the mean quadratic error
- 5) Bias component of the mean quadratic error.

Clearly these measures cannot be considered as reliability measures of provisional estimates. However they permit evaluations if revisions are always (or almost always) of the same sign. If this were the case, a correction of preliminary estimates would be needed.

3.2.2 Econometric analysis of revisions

Econometric analyses and tests can be conducted on both successive versions of vintages of data. In our approach it is recommended to conduct the analysis on vintages. Furthermore, it is assumed that the last available vintage of data could be considered as the final one.

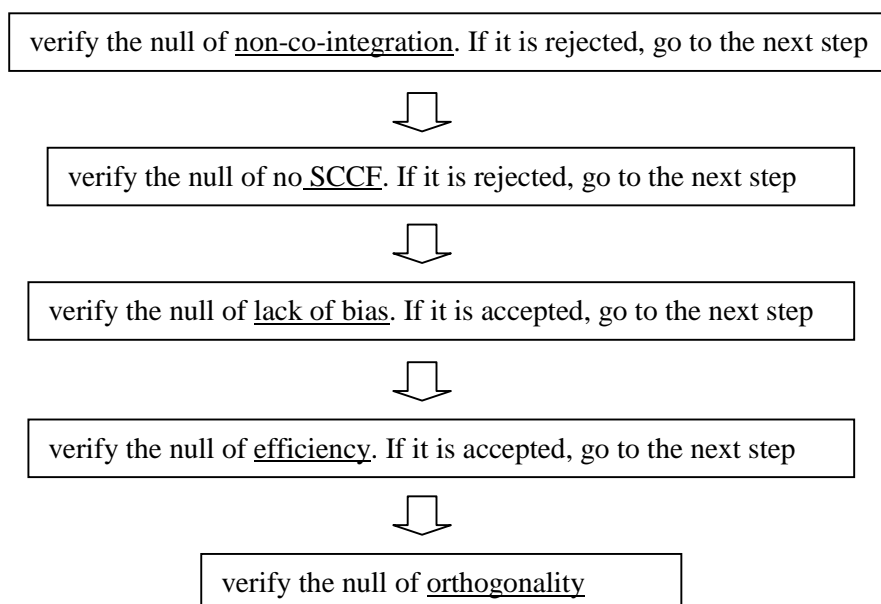
Most econometric techniques for our purposes use tests borrowed from the rational expectation theory. In this context preliminary estimates are considered as different forecasts of the final one, conditional on the available information at the time they are made. In consequence, tests of the rationality of the expectations can be used to assess the accuracy of provisional estimates.

The following tests are proposed in our approach:

- 1) Test for lack of bias which means that the mean of revisions should be zero;
- 2) Test for weak efficiency which means that revisions should be unforecastable from the information available at time t . This information comprises of the preliminary vintage itself and a constant term. Hence, efficient use of this information would improve the initial vintage as a predictor of the final one. Weak efficiency is a sufficient, but not necessary condition for unbiasedness.
- 3) Test of orthogonality which means that revisions should be unforecastable from all the relevant variables available at time t . All the available information can include: past history of the revisions process, the phase of business cycle, the dynamic of the inflation process, the period in which the preliminary estimate is made, etc. Since orthogonality is a particular case of weak efficiency, it is the most restrictive test proposed.

These tests permit access to the randomness of the revision process, but they cannot be considered as exhaustive. In fact, another relevant and advisable property is the co-integration of successive vintages of data. The absence of co-integration means that a non-stationary variable (or a combination of these) has been omitted between the preliminary and the successive vintage. This omission can be due to different factors such as: measurement errors in the preliminary estimates, their accumulation over the time, use of unrepresentative data, incomplete sampling, etc. This explains the importance of testing the hypothesis that there exists a stationary linear combination of two vintages. At this point it is important to clarify the relationship between cointegration and rationality. The preliminary vintage could be a biased and inefficient predictor of the final one, but the two could well be co-integrated. Thus, co-integration is necessary, but not sufficient, for unbiasedness and efficiency. This is obvious because co-integration pertains to long-term movements. Two series could be co-integrated but they could have different business cycle behaviours. This consideration leads to the last important point of our scheme for the analysis of revisions. We need to investigate the similarity of vintages in terms of serial correlation common features (SCCF). Successive vintages will have SCCF if it is possible to define a linear combination of their cycles, which does not contain any cyclical component. In other words we need to test if a linear combination of the first differences of vintages is a white noise. Table 8 will present our sequential strategy for the econometric analysis of revisions.

Table 8: Sequential strategy for an econometric analysis of the revisions



3.2.3 Conclusions

The analysis of revisions presented above is quite complete and of easy application. It is recommended to use this strategy in all the domains of short-term statistics inside Eurostat and with particular attention for the Euro-Zone data. Much relevant information can be obtained from this analysis: it will be possible to identify and correct inconsistencies between preliminary and normal estimates of the same variable; it will also be possible to identify and, where possible to correct, missing relevant variables during the process of preliminary estimates. Anyway the major contribution from this analysis is expected in terms of improvement of our preliminary estimates and nowcastings (see Ladiray Mazzi xxxxxxxxxxxxxxxx).

4. Short-term harmonised statistics for Euro-Zone

One of the main Eurostat missions is to provide rules and methods to allow Member States to compile harmonised statistics. As mentioned in section 1, this activity of Eurostat essentially concerned structural statistics. This situation determined a sort of break between short-term and structural statistics. This was particularly evident in some areas where same variables were computed both on high and low frequency. This was the case of national accounts where annual data was harmonised following ESA 79 rules but quarterly accounts were compiled following national methodologies.

Starting from the 1990's, Eurostat also decided to put in place a set of legal acts concerning short-term statistics. Harmonisation is also an important aspect for short-term statistics: it can improve the comparability of data but moreover, it can represent an important contribution to the construction of reliable Euro-zone and EU-15 aggregates. The only problems could be represented by an increase of the time lag of publication and by the fact that not all Member States are able to provide such harmonised data.

4.1. Legal act in the field of short-term statistics

Some of those legal acts concerned only short-term statistics (i.e. regulation on harmonised index of consumer prices), whilst some others involved both short-term and annual data. In this second case an additional important result coming from the harmonisation process is represented by the consistency between the same information at different frequencies.

Many legal acts now cover different areas of short-term statistics. In table 9 we present the availability of legal acts following the main Euro-SICS domain.

Tab. 9: Availability of legal acts by domain of Euro-SICS

Domains	Harmonised data	Legal act	National data
Balance of payments	YES	NO	YES
Energy	NO	NO	YES
External trade	YES	Intrastat directive	YES
Industry	YES	Reg. on short-term business statistics	NO
Labour Cost	YES	X	YES
Employment, Construction	YES	Reg. on short-term business statistics	NO
Employment, Industry	YES	Reg. on short-term business statistics	NO
Monetary and Financial Indicators	YES	NO	YES
National Accounts	YES	ESA 95 Regulation	NO
Prices	YES	Regulation on harmonised index of consumer prices	NO
Prices	YES	Regulation on short-term business statistics	NO
Retail sales Index	YES	Regulation on short-term business statistics	NO
Unemployment	YES	NO	NO

The table clearly shows that harmonised data does not always come from existing legal acts. This, for example, is the case for balance of payments figures which are harmonised on the basis of the 5th IMF compilation manual. Among the domains under implementation it is important to observe that short-term qualitative surveys produced by DG EFCIN can be also considered as harmonised data due to an agreement between the European Commission and the national institutes in charge of the compilation of those surveys.

4.2. Open problems on short-term statistical legal acts

The added value coming from a harmonisation process can be, at least partially, cancelled by a series of problems, which can represent an impediment for the utilisation of new figures by final users. It could be reasonable, in the process of negotiations of a new legal act, to analyse both producers and user needs in order to find an optimal solution in terms of data to be produced.

Unfortunately, in many Eurostat legal acts, the producers' point of view has been retained. In addition, the fact that the Euro should be adopted from the 1st January 1999 has been quasi completely ignored. For these reasons many short-term harmonised series are characterised by some disadvantages from the users' point of view. Main critiques to short-term harmonised statistics are:

a. Inadequacy of the time lag of availability

Time lags of delivery have been chosen in a quite conservative way in almost all legal acts. In this context the only positive example is represented by the regulation on harmonised index of consumer

prices where imperative and reasonable deadlines have been defined and continuously improved. In addition not all Member States observe deadlines and the presence of some derogations complicate the situation.

b. Insufficient length of harmonised time series

The adoption of a new methodology implies a break in the time series produced by Member States. Unfortunately, not always adequate backward calculation programs have been defined as an integral part of legal acts. On the other hand, where such programs have been defined (i.e. ESA 95 regulation) too many derogations have been accepted and not all Member States follow the timetable.

c. Unsatisfactory coverage

Not necessarily all relevant indicators for the users are included in the delivery program of legal acts. As an example we can mention the unavailability of any indicator related to quarterly non-financial accounts in the ESA 95 transmission program. On the other hand, some indicators included in the transmission program have no relevance from the users' points of view (i.e. actual final consumption in the ESA 95 regulation).

d. Unavailability of some or all harmonised indicators for a certain number of Member States

Not all the countries are able to compile data required in the legal acts. In many cases there are some derogations for those countries. This problem can be judged to be of a minor importance in the cases where small Member States are involved. In contrast, when this problem concerns the big ones (i.e. new industrial orders in the context of short-term business statistics regulation), the situation is much more serious, in particular due to the impossibility of estimating Euro-zone and EU-15 totals.

It is essential to go through existing legal acts in order to obtain data really useful for the users. This should be possible by a revision of the transmission program of the different legal act, but this can take long time. Alternatively it is possible to negotiate with Member States and to obtain a gentleman's agreement on the main crucial points starting from the elimination of all derogations. An additional important area is represented by the reduction in the delay of publication for the key economic indicators. This objective can be achieved by both implementation of new estimation techniques of normal releases and implementation of flash estimates as already done in some Member States and in the US and Canada.

4.3. Calculation of European totals

The usual strategy is to define a harmonised indicator, to collect harmonised data from Member States and then to aggregate them. Unfortunately, this strategy cannot be considered to be a perfect one in all fields of short-term statistics. Not all the Member States are able to provide all the required indicators and the delays of publication can be quite different from country to country. In this situation, estimations instead of aggregations are frequently used to obtain European totals. Our objective must be to produce reliable, accurate and long-time series with a short time lag for Euro-zone and EU-15.

Two examples are presented in the following subsections:

- Quarterly national accounts which can be viewed as a good example of complementarity between harmonisation and estimation.
- HICP which represents the classical example of harmonisation and aggregation.

4.3.1. Quarterly National Accounts

/Since not all the countries compile quarterly accounts and due to the fact that quarterly figures are available with different time-lags, Eurostat developed an estimation methodology for Eur-11 and Eu-15 totals. It is used each quarter to calculate three different releases at 70, 100 and 120 days after the end of the quarter. The only difference between these estimates is represented by the amount of information used.

The problem consists of the estimation of the quarterly values for the EUR-11 and EU-15 totals starting from the available information. This is obtained from annual totals (available for all Member States) by using the quarterly available information at each time point.

From a statistical point of view, this problem is known as temporal disaggregation of time series. Given an annual series and one or more quarterly indicators, the aim is to derive the quarterly figures in the context of a statistical model. The main hypothesis is that the indicator series (the available quarterly series) are good indicators for the path of the variable of interest. This is the case of the EUR-11 and EU-15 aggregates: the indicator series is a part of the target series (it represents more than 90% at 120 days and not less than 80% at 70 days) and its movements are strictly related to the movements of target series (the influence of the countries that do not compile quarterly national accounts may be deduced from the annual relationships).

The principle is exactly the same in the estimation of the quarterly data when the annual data is still not available. The extrapolation is done using the available quarterly values of the indicators according to the estimated model derived from the time disaggregation procedure (this case, usually known as current year estimation, is particularly important).

Eurostat's procedure for the estimation of EUR-11 and EU-15 quarterly totals foresees:

- (i) first of all the estimation of the quarterly value of EUR-11 GDP and preliminary estimation of its components according to the univariate method of Chow and Lin (1971). This method is based on the idea that a regression model describes the relationship between the unknown basic series and some quarterly indicators, both at quarterly and annual level. The best estimator of the unknown values of the basic series is given by a linear prediction associated to a regression model. The estimation of the parameters of the model is done on the basis of the maximum likelihood approach or by the generalised least square method. The solution is then:

$$\mathbf{y} = \hat{\mathbf{X}}\hat{\boldsymbol{\beta}} + (\mathbf{V}\mathbf{D}'\mathbf{V}_0^{-1})(\mathbf{y}_0 - \mathbf{X}_0\boldsymbol{\beta}),$$

where \mathbf{X}_0 and \mathbf{X} represent the annual and the quarterly matrix of indicators, respectively, and \mathbf{V}_0 and \mathbf{V} the corresponding matrix of variance and covariance;

- (ii) the estimation of the EUR-11 GDP components in an accounting framework, respecting the accounting constraints (the sum of the components of GDP is equal to GDP), starting from the preliminary estimations, using the multivariate method of Denton (1971). The aim of this technique is to distribute the difference between the quarterly sum of the preliminary estimates of the components and the quarterly value of the GDP by ensuring temporal consistency with the available annual data (relative to the components).

The idea is to smooth the difference gradually by ensuring the temporal consistency simultaneously.

As in the univariate case, the starting point of the procedure is the minimisation of a quadratic loss function:

$$\min_{\mathbf{y}} (\mathbf{y} - \mathbf{p})' \mathbf{M} (\mathbf{y} - \mathbf{p}),$$

subject to the time consistency and to the accounting constraints and where

$\mathbf{y} = [\mathbf{y}_1, \mathbf{y}_2, \dots, \mathbf{y}_M]'$ and $\mathbf{p} = [\mathbf{p}_1, \mathbf{p}_2, \dots, \mathbf{p}_M]'$ are the matrix of the final and preliminary estimates, respectively. The solution is then given by:

$$\hat{\mathbf{y}} = \mathbf{p} + \mathbf{M}^{-1}\mathbf{H}'(\mathbf{H}\mathbf{M}^{-1}\mathbf{H}')^{-}(\mathbf{y}_a - \mathbf{H}\mathbf{p}),$$

where $\mathbf{y}_a = [\mathbf{z}, \mathbf{y}_{01}, \mathbf{y}_{02}, \dots, \mathbf{y}_{0M}]'$, \mathbf{H} is the aggregation and accounting constraint matrix as well as $\mathbf{H}\mathbf{y} = \mathbf{y}_a$ and $(\mathbf{H}\mathbf{M}^{-1}\mathbf{H}')^{-}$ denotes the generalised Moore-Penrose inverse of $(\mathbf{H}\mathbf{M}^{-1}\mathbf{H}')$. One characteristic of the Denton procedure is to respect, as much as possible, the growth rates of the series concerned;

- (iii) the estimation of the EU-15 GDP and the preliminary estimation of its components starting from the estimated EUR-11 data and the data coming from the non Economic and Monetary Union Member States according to the Chow and Lin's univariate method;
- (iv) finally, the estimation of the EU-15 components, starting from the preliminary estimates, respecting the accounting and temporal constraints imposed by the estimated EU-15 GDP, according to Denton's multivariate procedure.

This procedure gives a set of estimated values that respect both the contemporaneous accounting constraint (the sum of the quarterly values gives the corresponding annual value) and the temporal constraint relative to the past years (the sum of the quarterly values must give the corresponding annual value). See Barcellan R. and Mazzi GL. (1999) for more details.

4.3.2. Harmonised index of consumer prices

A complete different situation is represented by the HICP where a simple aggregation used to generate Euro-zone and Eu-15 totals. At country level sub-indices based on COICOP classification are weighted on the importance of consumers' expenditure on each category varying from country to country. HICP is defined as the weighted average of sub-indices.

$$H = \sum W^i H^i$$

Since January 2000 the coverage of EU's HICPs is virtually 100% of household final monetary consumption spending.

Household final consumption expenditure by all population groups on the economic territory of a Member State is included in HICP. The geographical and population coverage was fully harmonised with the January 2000 index. The product coverage is rising from approximately 95% of Household Final Monetary Consumption Expenditure in January 1997 to virtually full coverage in January 2001. The extension is possible due an agreed methodology on tax-like charges and on subsidies.

The HICP index is computed as an annual chain-index allowing for country weights changing each year. Higher level indices are aggregated in the year 2000 by linking weighted averages of lower level indices since December 1999 with the level of the corresponding aggregate in December 1999.

The Eur-11 Index of Consumer Prices is calculated as a weighted average of HICPs of the participating countries of the EMU. The index is an annual chain index allowing for country weights changing each year. The weight of a Member State is its share of private domestic consumption in the EMU total.

$${}_{96}M(11)_{J99} = \sum_{m=1}^{11} {}_{96}c^m {}_{96}H_{D96}^m * \sum_{m=1}^{11} {}_{96(D96)}c^m {}_{D96}H_{D97}^m * \sum_{m=1}^{11} {}_{96(D97)}c^m {}_{D97}H_{D98}^m * \sum_{m=1}^{11} {}_{97(D98)}c^m {}_{D98}H_{J99}^m$$

with:

${}_{96}M(11)_{J99}$ as the MUICP at January 1999 for the 11 participating Member States of EMU with 1996=100;

c^m as the country weight for Member State m, where

${}_{96}c^m$ is the country weight used in 1995 and 1996, which are National Accounts data for 1996,

${}_{96(D96)}c^m$ is the country weight used in 1997, which are National Accounts data for 1996 price updated to December 1996,

${}_{96(D97)}c^m$ is the country weight used in 1998, which are National Accounts data for 1996 price updated to December 1997, and

${}_{97(D98)}c^m$ is the country weight used in 1999, which are National Accounts data for 1997 price updated to December 1998.

4.4. Seasonal adjustment

The treatment of seasonality is a very important point aspect in the context of short-term statistics. Seasonally adjusted figures are frequently considered by final users as being the most important information. Nevertheless, in the legal acts concerning short-term statistics there are no specific recommendations to Member States concerning this matter. For this reason, efforts to harmonise seasonal adjustment techniques in the Member States can be considered as of primary important.

The ECB and Eurostat have recently published their recommendations for seasonal adjustment in two important reports:

- “Eurostat recommendations concerning seasonal adjustment policy”, a report of the internal task force on seasonal adjustment, Eurostat, January 2000.
- “Task Force on Seasonal Adjustment, Final Report”, European Central Bank, January 2000.

These recommendations have now to be tested and applied and two main problems can be highlighted.

In these reports TRAMO/SEATS and X12-ARIMA are recommended as standard methods for seasonal adjustment. These two softwares must be compared in terms of revisions and accuracy as far as the main European economic indicators are concerned. Empirical studies show that the choice is not clear and can vary according to the analysed series. As an example, for the M1 monetary aggregate X-12-ARIMA clearly shows fewer revisions and a slight advantage over TRAMO-SEATS can be detected for M3.

Euro area series are mainly compiled by aggregation of national data. For the seasonal adjustment of these data, there are four options:

- a) seasonal adjustment of aggregated raw components (direct approach)
- b) aggregation of seasonally adjusted components (indirect approach)
- c) aggregation of seasonally adjusted data from Member States
- d) simultaneous derivation of seasonally adjusted series (multivariate approach)

The differences in the four approaches, and in the derived components, correspond to the differences in the information set which is considered in the information process (see Campolongo and Planas (2000), for a theoretical overview on this subject). Some empirical studies have shown that differences in multivariate vs. univariate approaches are relatively small. The empirical results show that direct and indirect approaches produce equivalent results only under very restrictive assumptions, i.e. when no trading day or outlier correction is made, the decomposition is additive and no forecast is produced. In practice, such conditions are rarely met and the differences in the series produced under the two rules can be significant, depending on the series concerned. Some criteria to discriminate between direct and indirect approaches can be put forward: smoothness of seasonally adjusted series, minimisation of revision errors, stability of seasonal component and out-of-sample forecast accuracy.

A comparison between direct and indirect approaches has been presented by Alvira, Barcellan and Mazzi (2000) with reference to the Euro-zone GDP. The results obtained show that the indirect approach produces more smoothed figures than the direct one. On the other hand, the indirect approach is characterised by a higher variability of seasonal factors. More detailed analyses are needed in all relevant areas to assess a common seasonal adjustment strategy for Euro-zone figures.

Among all other theoretical considerations, the direct approach seems to be preferred, particularly when estimation and nowcasting are made. The use of direct approach implies the loss of the additivity between national data and Euro-zone totals. Users should be informed about this situation. From the producer's point of view it will be essential to continuously verify that directly obtained Euro-zone seasonal adjusted figures should be consistent with national data.

4.5 Flash estimates

Regular estimates for a specific variable are scheduled by Member States when they judge that the amount of the information is sufficient to ensure an appropriate level of reliability. This decision is a compromise between timeliness and accuracy where, in many cases, producers privilege the second one. On the other hand, users would like to privilege timeliness in order to obtain the most updated information on the economic aggregation. One possible answer to this dilemma is represented by the production from Member States of flash estimates for key economic variables. Typically, flash estimates are based on a restricted and incomplete set of information and they require the use of more sophisticated statistical tools than regular ones. Alternative sources could be used to fill an information gap, and statistical tools must be used to improve the robustness of those estimates. Some Member States are already actively working in this direction (Belgium, Italy, the Netherlands, UK, etc.) but a more relevant effort is required. A change of attitude is requested in some statistical offices: official statistics should be viewed not only as a simple collection and synthesis of information, but also more generally as an estimation process to be used when needed. Different statistical methods for flash estimates are currently compared in different projects where Eurostat is playing an active role. These techniques include: temporal disaggregation methods, multivariate time series methods and dynamic regression methods. Non-linear approaches such as artificial neural network and switching Markov processes could also be used under the Commission of the availability of sufficiently long time series. Many important developments are expected in this field in the coming years in order to reduce the deadline of publication of the most important variables. The adoption of flash estimate techniques by a large number of Member States can be a positive impact on the deadline of production of Euro-zone and EU-15 totals.

5. Conclusions

The development of the short-term statistical system is an essential requirement for an efficient definition of economic and monetary policy. In the recent past, much progress has been made by

Member States in this context, but the situation cannot be considered completely satisfactory, particularly in comparison to the United States.

There are some Member States which are more or less in line with the United States but if we consider the average behaviour of Member States the objective still seems to be quite far away. Euro-zone data suffers from this situation if it is intended to be an aggregation of national figures. If we are unable to obtain a considerable increase in timeliness and reliability of national data, we cannot expect an improvement of Euro-zone statistics. To this view, the achievement of the main Euro-SICS objectives mentioned in section 2 must be considered by all the bodies of the European statistical system as their first priority. In addition, an improvement in the legal act concerning short-term statistics and the creation of new ones concerning key areas not yet covered (public finance statistics, labour market, etc.) will represent an important step in the creation of a complete set of short-term harmonised statistics. Finally, clear rules in the context of seasonal adjustment as well as the adoption of flash estimates techniques to reduce the first publication of key indicators will be viewed as another important contribution to improve the quality, reliability and usefulness of our short-term statistics.

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