

THE OECD SYSTEM OF LEADING INDICATORS: RECENT EFFORTS TO MEET USERS' NEEDS

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Keywords: OECD system of Leading Indicators - Users' expectations - Data dissemination - Data presentation - Growth cycles - Inter-area comparisons - Component-oriented analysis - Composite indicators - Monetary Union - Survey data - Convergence in cyclical behavior.

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1. Introduction

The OECD system of composite leading indicators (CLI) consists of leading indicators for 22 Member countries and 7 country groupings such as, major seven countries or Europe. The Statistics Directorate (STD) of the OECD has been publishing CLI since 1981 using a modified version of the method developed by the US National Bureau of Economic Research (NBER).

CLI data are published in the *Main Economic Indicators* (MEI) publication as well as in a monthly note. Historical data are available on Leading Indicators and Business Surveys (LIBS) diskettes. Since 1996, information about CLIs has been available on the OECD web site. This has broadened the audience of OECD CLIs who have continuously provided STD with various feedback. STD has attempted to reflect these views in the compilation and dissemination of CLIs. STD also aims to convince potential users of the usefulness of the OECD system.

This paper aims to provide information on the recent developments within STD regarding the expectations of users of the OECD system of CLIs. For the past two years, STD has received more than hundred questions, requests or suggestions from users, or potential users, of CLIs in a variety of institutions including national banks, national statistical offices, universities and economic services. It should be emphasised that this is not the result of a user survey but voluntary feedback from users. Even given this limitation, the feedback provided by CLI users still gives valuable insight on how CLIs are used, by whom, and where changes in the OECD methodology should be incorporated, in particular, those which will expand the use of the CLI by both OECD internal and external users.

This paper is organised as follows. A description of the OECD system of CLIs is given in section 2. Section 3 discusses the information available in various publications or the web site of OECD. In section 4, the various users' requests are examined and the main conclusions concerning their expectations are drawn. Finally the directions in which STD proposes to concentrate its efforts are summarised in section 5.

2. The OECD system of CLIs

This section gives a brief description of the methodology used in the compilation of the OECD CLIs. This explanation is mainly extracted from the publication "*OECD Leading Indicators and Business Cycles in Member countries, Sources and Methods 1960-1985*", No.39, OECD (1987) and from an article available on the OECD Internet site¹ "*OECD Composite Leading Indicators: a tool for short-term analysis*", OECD (1999). The programs that are used to compile CLIs have been written by the OECD statistics directorate using the FAME language.

¹ <http://www.oecd.org/std/li1.htm>

Composite leading indicators for individual countries.

The total industrial production index has been chosen as reference series for each country². The Gross Domestic Product (GDP) may have been a more obvious choice; however, GDP has a major disadvantage of only being available on a quarterly basis, while the industrial production index is compiled every month. Production in industry includes almost all the sectors susceptible to medium-term variations which are the most appropriate for analysis by the cyclical indicators technique. In addition, many non-industrial sectors such as associated services display cycles connected to that of industry.

The “growth-cycle” or deviation-from-trend approach has been retained. The point of departure is that essentially the same medium-term variations exist in many different economic indicators and that the timing differences which exist between them may be exploited for the purposes of forecasting. However, the variations are obscured by different rates of growth of long-term trend and therefore measuring deviations from trend is appropriate.

Long-term trends in time series are estimated using a modified version of the Phase Average Trend (PAT) method developed by the US National Bureau of Economic Research (NBER). The PAT procedure requires an initial list of turning points which define the cyclical phases. Initial turning points estimates are calculated using the Bry-Boschan routine³. The trend is eliminated from the series by dividing the original series by the trend to give a ratio-to-trend since the underlying structure of most series used is multiplicative. However, some component series are considered to have an additive structure. They are detrended by subtraction to give a difference-from-trend.

The component series used in the compilation of the CLIs were selected according to several criteria. These include consistency and length of lead of the detrended indicator over the detrended reference series at cyclical turning points, absence of extra or missing cycles, smoothness, frequency of publication, economic significance, breadth of coverage and theoretical justification of the leading relationship. An evaluation is also necessary on the basis of a number of practical criteria: freedom from excessive revisions, timeliness of publication and availability of a long run of data of statistically satisfactory reliability. The main leading indicator series used in the OECD system are: business surveys results on production, stocks, order books and new orders; monetary and financial indicators such as monetary aggregates, interest rates and share prices; construction indicators; terms of trade; stocks.

Prior to aggregation into a single CLI, component series are smoothed according to their MCD⁴, in order to reduce the irregularity of the final composite indicator. They are also normalised, to homogenise the cyclical amplitude.

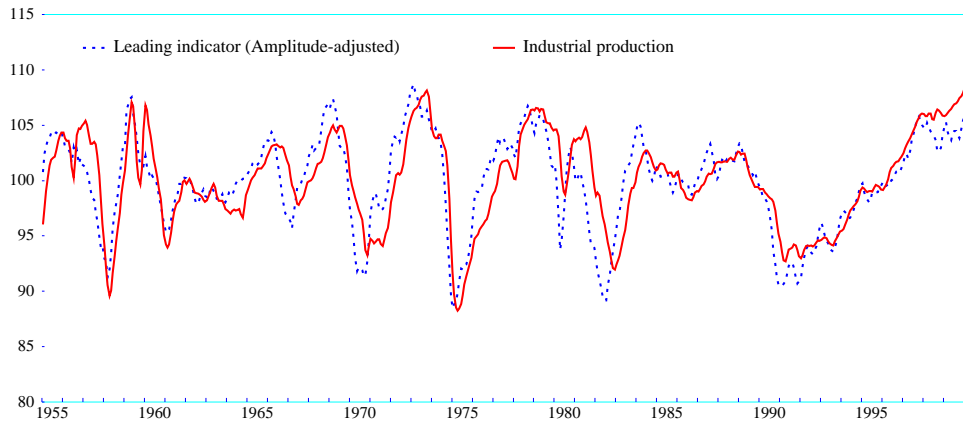
The CLI is calculated by aggregating the detrended component series. For presentation, an adjustment of the cyclical amplitude to equal that of the reference series is carried out. In the following figure, we can easily compare the evolution of both series. In particular, this is a way of emphasising how well the CLI has predicted the turning points in the economy of a country (the United States in this example).

² Exceptions are industrial production in manufacturing for the Netherlands and Norway and volume of manufacturing sales for Denmark.

³ See [1] and [2] for more details

⁴ Months for Cyclical Dominance. For details, see [1] page 42.

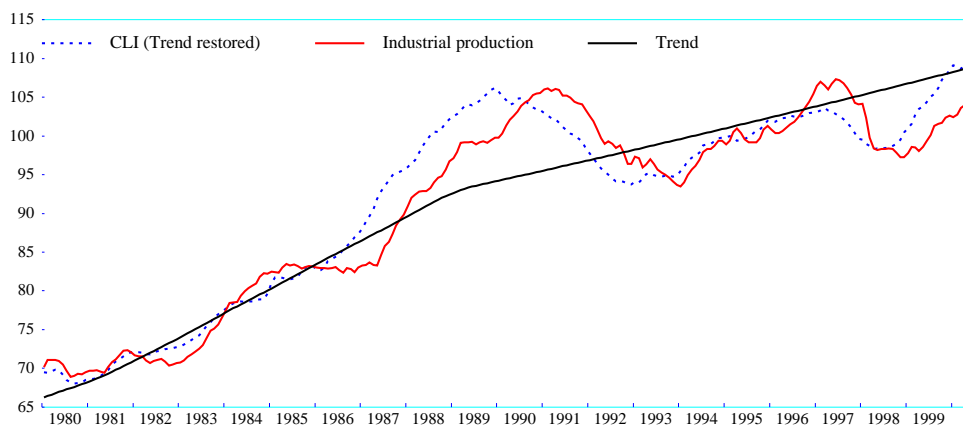
Figure 1. Cyclical developments in the United States
Ratio to trend (smoothed)



This form of the CLI is called the amplitude-adjusted and ratio-to-trend CLI. This can then be multiplied by the trend of the reference series to obtain the trend restored CLI.

This trend-restoration enables direct comparison with the reference series. It gives an idea of the amplitude of future changes in reference series but this quantitative information should be interpreted very carefully, since component series are not selected according to a strict quantitative criteria based on the cross-correlation with the reference series. The following graph compares the trend restored CLI with the industrial production in Japan over the twenty past years.

Figure 2. Industrial production and leading indicator for Japan



Composite leading indicators for zones

In addition to CLIs for 22 individual Member countries, the OECD publishes CLIs for the following groups of countries or zones: OECD total, Major seven countries, OECD Europe, European Union, Big four European countries, NAFTA (North American Free Trade Agreement) and since October 1999, Euro area.

The reference series for a zone is the weighted average of the individual countries reference series. The weights are derived from GDP originating in industry and the GDP Purchasing Power Parities for 1995. The amplitude-adjusted CLI for the zone is calculated by weighting together the amplitude-adjusted CLIs for individual countries, using the same weights as for the reference series. The same method is used to obtain the industrial production trend for the zone. Then, the trend restoration is done as for individual countries, by multiplying the amplitude-adjusted composite indicator by the trend of the reference series.

3. Information currently available

The information on OECD CLIs is currently made available monthly in the following three publications: *Main Economic Indicators (MEI)* which is disseminated as an electronic product and as a paper publication, *Leading Indicators and Business Surveys (LIBS)* which is disseminated electronically and the *Monthly note of leading indicators* which is available as a printed edition and on the Internet (<http://www.oecd.org/std/li1.htm>).

In addition to the monthly note, the OECD Internet web site contains general information on OECD CLIs such as methodological information, how they can be used, etc.

Two other publications should also be mentioned: the very latest figures for the trend restored CLI are available in the weekly *OECD Hot File* and graphs of historical CLI data for some area totals are published in the annual *OECD Historical Statistics*.

Note that the information disseminated on the web site is available free of charge, unlike information disseminated in paper publications and other electronic media.

This section describes in detail for each type of information how different issues are dealt with in the different publications. A distinction is made between the *historical data* that are little revised and that give information on the past cycles, and the *recent data* that may be more subject to revisions from one month to another and give information on the future developments.

Methodological information

This information is disseminated via the OECD Internet site. The primary purpose is to show how CLIs can be used in practice.

Regarding the general methodology, a brief description of the procedures of CLI calculation is given on this site. Reference is also made to different articles and publications related to the OECD methodology.

On the OECD Web site users can find updated statistical characteristics of the different OECD CLIs. Some of these characteristics are summarised in the last page of the monthly note. These are the MCD value, the CLI median lead, the mean deviation from median, the total number of components as well as the number

of components available for the computation of the index for the last month⁵. Some of these characteristics are likely to be modified from one month to another. Other characteristics that are rarely modified are available on the web site, independently from the monthly note. They comprise the list of component series and the sequence of turning points for the reference series⁶.

Users are also provided with an example of analysis using OECD CLIs. This is done in section 4 of “*OECD Composite Leading Indicators: a Tool for Short-term Analysis*”.

Links are also made to related papers.

Historical data

Historical data for the reference series, composite leading indicators and component series are available in the LIBS monthly diskettes. In this publication, currently, no explanation is given on the way the leading indicators are compiled. This means implicitly that only users who already have a good knowledge of OECD CLIs are able to use the data in an optimal way.

Recent data

Recent data on trend restored CLI are published in the three main monthly publications cited above; a little more than one year is provided in MEI and the monthly note, and the whole time series in LIBS. In the monthly note, additional information is available to assist users in their analysis and interpretation of recent developments in CLIs. This consists of the monthly growth rate of the trend restored CLI, the 12 month percentage change at annual rate of the trend restored CLI along with the reference series long-term trend rate.

Recent data for the ratio to trend CLI as well as for the trend of the reference series and for the different forms (original, ratio to trend or difference from trend) of component series are disseminated in LIBS.

Summary of information available on each aggregation level

Table 1 summarises the information available. Each level is the aggregation of leading indicator series of the lower level. As one can see, individual country level is the level at which the information is the most developed, in particular, the statistical characteristics. For the most aggregated levels, that is, the area totals and OECD total levels, recent data are available on the three main dissemination media. Lastly, data for component level are available only on LIBS.

⁵ For individual countries, 40 % of the components is required to compile the CLI for a given month.

⁶ The sequence of turning points is provided only for the countries whose CLI has been recently revised.

Table 1. Information available on each aggregation level

Level	Aggregation level	Type of information	Available on
4	Total OECD CLI	Statistical characteristics	Not available
		Historical data	LIBS
		Recent data	LIBS, MEI, Internet
3	Area totals CLIs	Statistical characteristics	Not available
		Historical data	LIBS
		Recent data	LIBS, MEI, Internet
2	Individual countries CLIs	Statistical characteristics	Internet (partially available)
		Historical data	LIBS
		Recent data	LIBS, MEI, Internet
1	Component series	Statistical characteristics	Not available
		Historical data	LIBS
		Recent data	LIBS

4. Users' requests

Users are encouraged on the OECD web site, to request additional information and provide STD with feedback on the dissemination of CLIs. Most of these requests are sent by email to a generic account⁷. Some users also contact STD by fax. These can be precise questions on a particular issue or requests for general methodology. Some users only send suggestions. Once they have been answered, these requests are stored in a database. In order to check the relevance of the CLI dissemination and to improve the product, a detailed examination of these requests has been undertaken. The most recent feedback has been taken into account in the preparation of this paper. This encompasses more than hundred requests received during the past two years.

The analysis of user's requests has been done according to the following two dimensions: by subject and by geographical area to which the request is related.

It should be noted that the financial crisis in Asia as well as the introduction of the European single currency occurred during the period during when these requests were received. This explains why so many requests are related to these two subjects.

By subject

The requests are classified in Table 2 according to the subject mentioned. Note that in this paper, "general methodology" means main principles used in the compilation of the CLIs for every country, in contrast to "statistical characteristics" which are specific to each CLI, such as, for example, the list of component series or component countries, their weights or the average lead at turning points.

⁷ stat.contact@oecd.org

Table 2. Users' requests classified by subject

Subject		%
Methodology	General Methodology	31.3
	Of which request for program (FAME calculations)	7.8
	Statistical characteristics and aggregation methods	35.9
	Of which: Area total	12.5
	Country	14.0
	Component	9.4
Data	Data (figures, turning points)	29.7
	Of which: Recent data	9.4
	Historical data	20.3
Others	Statistical tools	3.1
	Of which 12 months percentage change	3.1
Total		100.0

About two thirds of requests (67.2%) concern methodology.

Methodological questions are divided more or less equally between questions on general methodology (31.3%) and on the statistical characteristics of the CLIs (35.9%). Nonetheless, a number of requests (3.1%) are related to the statistical tools provided with CLI data to assist users in their interpretation.

The main reasons for users to request information on general methodology are for re-producing the OECD composite indicators; developing their own set of leading indicators, in particular for non-Member countries; teaching; comparing their own way of determining turning points with the OECD method. This emphasises the fact that many users contact the OECD in order to acquire OECD expertise and experience on the CLIs. In that context, dissemination of precise information about the compilation of the indicators and, above all, interpreting leading indicators within the framework of economic analysis is fundamental.

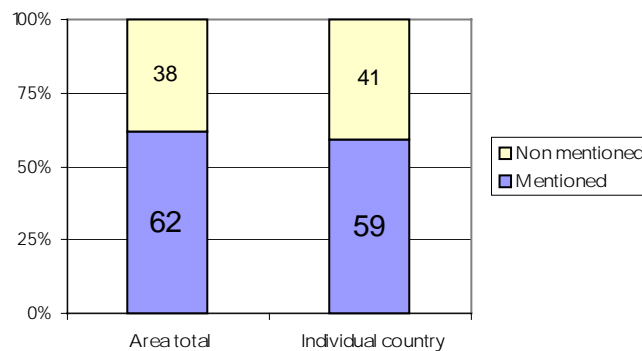
A large number of requests concerning statistical characteristics relate to the component series. This represents 9.4% of the total number of requests. This shows that users require regular information about the evolution of component series in order to explain developments in the CLI. For example, some users tried to determine the weight of share prices in the total CLI for Europe, in the context of the risk of the Asian crisis propagation from one region to the next.

Requests for data constitute only 29.7% of the requests received. This percentage is rather low compared to the proportion of questions on methodology but can be explained by the fact that a great deal of recent data is already available on the web site, as shown in Table 1. This is confirmed by the fact that two thirds of the data requests relate to historical data (20.3%). Questions about the current data often relate to recent or future turning points. Many users appear to be using data as input into a composite indicator or for studying reference cycles.

By type of geographic area

Figure 3 shows the percentage of requests for both categories of region (area total or individual country). It should be noted that some requests mention CLI from both categories.

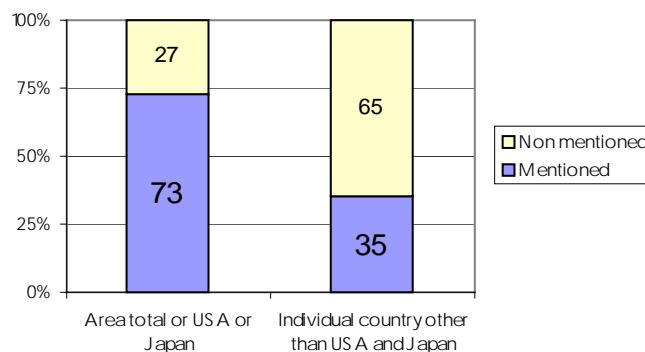
Figure 3: Users' requests by category of region



As mentioned in section 2 above, in addition to CLIs for 22 Member countries, CLIs are computed for the following area totals: OECD total, OECD Europe, European Union, Euro area, Four large European countries, Major 7 countries and NAFTA. 62 % of the requests mention at least one of these area totals. This is slightly higher than the proportion of requests mentioning at least one individual country (59 %).

Furthermore, the composite indicator for United States (30%) is clearly preferred to the one for NAFTA (3%) to illustrate the cyclical developments in North America. In addition, Japan is the only Asian country for which OECD provides a CLI. From this we can deduce that the CLI for these two countries are mostly used for comparison between the large world markets and can be equated with the area totals listed above. Taking this into account, the figure becomes:

Figure 4 : Users' requests by category of region when ranking USA and Japan with area totals



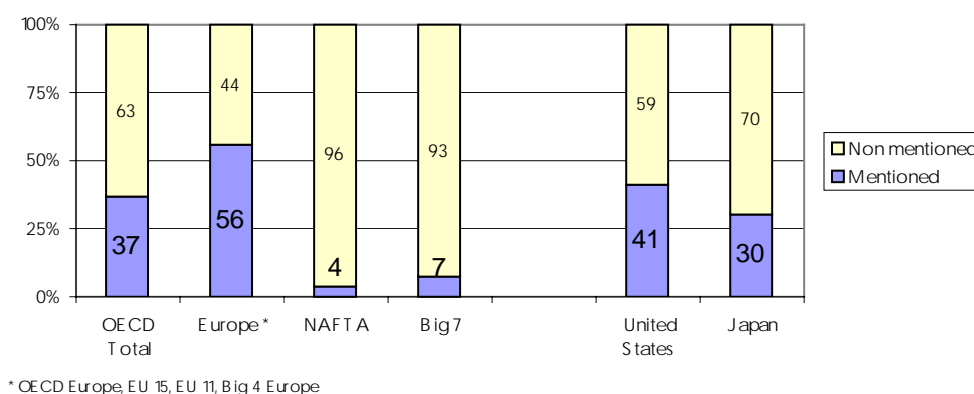
The proportion of requests mentioning an individual country other than United States and Japan is 35 %. Thus one can see the growing importance of international comparisons and the significance of economic analysis of geographic areas in the use of the OECD system of leading indicators.

Since the creation of the system of CLIs in the beginning of the 1980s, world trade has increased dramatically with economies becoming more and more open. Convergence of economies is the current line of development in each area. So, the evolution in area totals became more easily interpretable. This convergence has been reinforced by the creation of large regional markets such as NAFTA and the European Union in the beginning of the 1990s. Users are thus more and more interested in global developments in each area. They look for explanations for these developments as much in the various parameters of the economy (inflation, interest rates, share prices, production, employment, inter-area trade) as in the developments in each individual country of the area.

Since this is a system of leading indicators, information is provided for four different levels (OECD total, area total, country, component series). Therefore in addition to their turning point forecasting function, leading indicators, when formed in a system, can also be used as explanatory variables for the CLI aggregated at the higher level.

Figure 5 shows the proportion of requests concerning each group of countries, as percentages of the requests mentioning at least one group of countries (or the United States or Japan).

Figure 5: Users' request for large geographical area



The proportion of requests concerning the total of the Major 7 countries is very low (7%). This may be due to the fact that this group of countries is not a regional market and, on the other hand, that the total OECD (37%) is preferred as a proxy representation of the world economy. Europe is the area whose composite leading indicator has been mentioned most in recent years. This is mainly due to the creation of the European Monetary Union on 1 January 1999 and the introduction of the European single currency (Euro) now used in 11 European countries. At the same time, a composite leading indicator has been created for the Euro area.

Summary

What emerges from this examination can be summarised as follows. An attractive feature of the OECD work on leading indicators is the fact that they are based on a system with four levels of aggregation. It is possible to explain developments in the more aggregated CLI by studying developments at more detailed level. To allow this, users need detailed methodological information on the way each level is computed from the lower one. Data also need to be provided at each level. When individual countries economies are in a process of converging, CLIs for large regions are becoming more useful. This is the case, in particular, of the CLI for Europe when making comparisons between larger regional markets.

5. Efforts to meet emerging users' needs

In the light of the analysis presented in sections 3 and 4 above, STD proposes to review existing dissemination of information on CLI through consideration of the following options:

1/ To develop new tools for comparison between large regional markets. This has begun to be implemented with the recent creation of a CLI for the Euro area.

2/ To improve the information available on component series. This will be done by revising regularly the composition of CLIs for each individual country, and then keeping the users informed of the relevance of each component series.

3/ To modify the presentation of the monthly note on leading indicators. In particular, the new note should enable better cross-country and cross-area comparisons as well as the interpretation of recent developments of the CLIs. The aim of this is to expand the audience of users of CLIs and to ensure that CLIs are used optimally.

This section details the efforts undertaken by STD regarding these three issues.

A CLI for the Euro area

Section 4 shows that users are more and more interested in CLIs for large areas, provided these CLIs are representative of a regional market. With monetary union, the Euro area is an economic entity in its own right. A CLI for this area has been created and has been included in the monthly note since October 1999. This paragraph describes its characteristics.

The method used to compile the CLI for Euro area is the same as for the other groups of countries. This means that the CLI is obtained by aggregating together the CLIs for individual countries. An alternative method would have been to select Euro area component series and compile the aggregated CLI using the same approach as for individual countries. The method chosen presents the advantage of being in accordance with the framework of the OECD system. Developments in the Euro area CLI can be interpreted by analysing developments observed at country level. This analysis could be complemented with analysis of the cyclical evolution in the European Central Bank (ECB) indicators.

The reference series is Total industrial production. It is calculated by weighting together the seasonally adjusted industrial production indices expressed on 1995 = 100 for the eleven individual countries. Weights in Euro area, derived from GDP originating in industry and the purchasing power parity for 1995 are as follows:

Table 3. Composition of the Euro area CLI

Country	% weight
Austria	3.0
Belgium	3.7
Luxembourg	0.3
Finland	1.7
France	19.5
Germany	30.5
Ireland	1.7
Italy	22.5
Netherlands	5.0
Portugal	3.0
Spain	9.1
Total	100.0

Table 4 gives the sequence of turning points that has been retained. Turning points of minor cycle are in parenthesis. Note that initially, a trough was detected in May 1968 but since the reference series is significantly affected by strikes, the procedure was re-run using an estimate for this date instead of the original value. The actual trough is in August 1967.

The amplitude of a cycle at peak or trough is measured by the percentage deviation of the original series from the trend.

Table 4. Cyclical characteristics of reference series

Turning point dates (months)		Amplitude (% of trend)
Peaks	Troughs	
	3/63	-5.47
1/64		6.23
	8/67	-10.54
2/70		11.45
	12/71	-7.27
1/74		10.65
	7/75	-12.62
(1/77)		(8.61)
	(3/78)	(-6.42)
3/80		12.42 (10.27)
	12/82	-7.13
1/91		5.93
	7/93	-10.07
12/94		7.44
	12/96	-4.35

The amplitude-adjusted CLI for the Euro area is derived from the combination of the amplitude-adjusted CLIs of each individual country using the same weights as used to compute the industrial production index. 60% of the total weight of countries is required to compute the CLI for any given month.

The characteristics of this CLI are displayed in the following table. The median and mean lead at turning points as well as the mean deviation of the lead from the median are expressed as a number of months.

Table 5. Characteristics of composite leading indicator

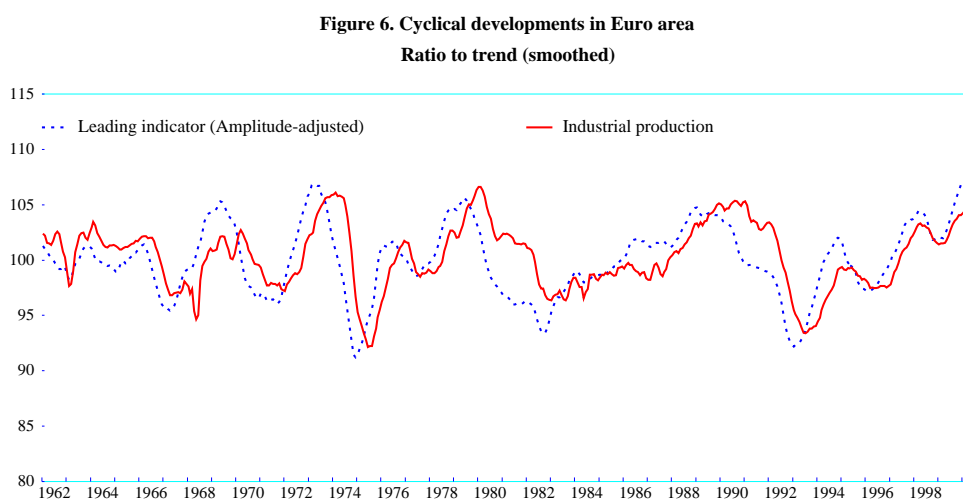
	Delay in release	Extra cycles	Start date	Mean lead at			Median lead at			Mean deviation from median	Cross-correlation (Lead : 6)
				All TP	Peaks	Troughs	All TP	Peaks	Troughs		
CLI	2	2	1962	5.8	7.7	4.3	6	9	3	3.4	0.81

This emphasises that this CLI is timely, the delay in release is two months. It predicts turning points in reference series 6 months ahead on average and the lead is significantly higher at peaks (median lead: 9

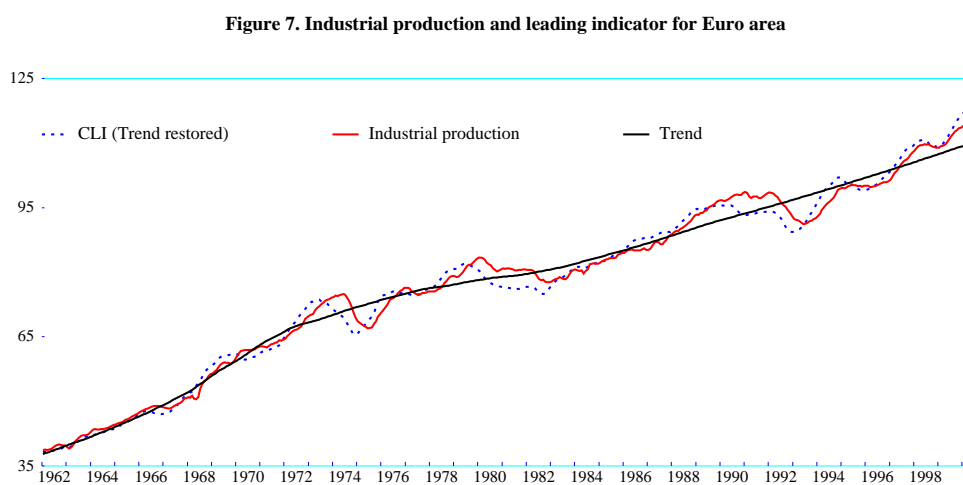
months) than at troughs (median lead: 3 months). The mean deviation from median is 3.4 months: i.e., the lead is not too dispersed. Two extra cycles are signalled during the period 1982-1992.

The trend of the reference series is obtained using the same aggregation method as for reference series and CLI.

The following graph shows the MCD smoothed, trend-eliminated series of the reference series against the amplitude adjusted leading indicator.



The following graph consists of reference series in original, seasonally adjusted and MCD smoothed form, and its trend, together with the trend-restored CLI.



The examination of the cyclical pattern of Euro area can be divided into four periods:

1/ Before 1972, amplitudes are relatively low.

2/ The period 1972-82 is marked by two cycles of large amplitudes, the two peaks being in January 1974 and March 1980.

3/ The 1980's are years during which amplitudes are not very pronounced. No major cycle occurred before the downturn of 1991.

4/ In the recent period (from 1992) the reference series tend to have a more cyclical behaviour with medium amplitudes.

Improving information on component series

In 1996-97 the CLIs for the major seven countries as well as for Belgium and Norway were modified to take into account the transformations in national economies. At the same time, a CLI was created for Mexico⁸. The CLIs for the 12 remaining individual countries have not been modified since the creation of the OECD system in the beginning of the 1980's. For some of these countries, the composition of the CLI may have become less relevant than at the time the CLI was set up. STD plans to revise these indicators on a cycle of about 3 years.

Each modification to an individual country's CLI would be the opportunity to publish, along with the monthly note, a short study explaining the revision. The cyclical characteristics of the different component series would be presented along with the performance of the revised CLI. The comparison between the former and the new list of component series would give useful information on the evolution of this country's economy.

Regular revisions would also reflect the convergence between countries in the same area. We can expect the list of component series to become more harmonised from one country to another. This would facilitate the interpretation of developments in CLIs for area totals.

Facilitating the interpretation in developments in CLIs

The propositions developed in the previous paragraphs of this section were aimed at improving on an on-going basis the quality and the quantity of information available in order to provide the users with a set of tools as complete as possible. Another important matter is the presentation of the information. In recent months, discussions have been held within STD, and with staff in other Directorates of the OECD to determine a way of disseminating the information in a concise as well as pedagogical way. The aim of the discussions was to extend use of leading indicators into a broader audience of internal OECD and external users, including non-specialists. STD proposes to modify the presentation of the monthly note.

In its present version, the monthly note provides a very standard format. A short text summarising the main developments in CLIs is followed by a set of graphs and tables in which CLIs for every countries and area

⁸ See [6] for more details. CLI for Mexico is an interesting illustration of how a CLI could have given clear and reliable warnings of a severe recession.

totals are dealt with in the same way. The last page of the monthly note gives the main statistical characteristics of the CLIs.

It is proposed to reduce the standard section of the note. The graphs showing cyclical evolutions would be published every month only for the large regions. The latest data would be summarised in an overview table containing only the very latest figures (less than 6 months) as well as some statistical characteristics for all countries and groups of countries.

At the same time, we would attach more importance to the description of the behaviour of the CLI of one particular country or group of countries. The choice of the country described could be in relation to the revision of the CLI as described in the previous paragraph, but could also be linked to current economic events. What STD feels is important is the necessity of providing the user with a reasonably detailed statistical analysis of the development of an economy in a given region. While providing detailed information, this would also provide an analytical approach which users may apply to other countries or areas.

6. Concluding remarks

The number of users that have taken the effort to contact the OECD to provide useful feedback and the diversity of their questions is a good indication of the extent to which OECD is well known for providing useful information. In particular, the fact that OECD provides CLIs for a large number of countries and groups of countries appears to be very attractive. This emphasises that OECD makes good use of the fact that its statistical activities are based on international comparison.

In order to keep the OECD system of CLI relevant, STD needs to monitor users' requirements on an on-going basis. In particular, STD should continue to encourage feedback from users and to develop accordingly the information available. Precise elements for the interpretation of the results should also be disseminated to allow non-specialist to use this system in an optimal way.

STD will also have to incorporate into the CLIs developments in the world economy, by regularly checking the relevance of the series used in the compilation of CLI and by calculating new CLIs, in particular for new OECD Member countries.

The assessment of the methodology currently used to compile OECD CLIs is also an important issue for the coming years.

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