THE LEADING ECONOMIC INDICATOR SYSTEM (LEIS) IN THE PHILIPPINES[1]

by

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I. Introduction

The generation of a system of leading economic indicators is based on the premise that the cycles of many economic data series are related to the cycles of total business activity, that is, they expand in general when business is growing and contract when business is shrinking. This involves the study of the behavior of indicators that consistently move upward or downward before the actual expansion or contraction of overall economic activity.

Leading indicators refer to measurable factors of economic performance that change before (ahead of) the underlying economic cycle starts to follow a particular direction or trend[3]. Since these statistics precede (by one to 12 months) other changes in economic activity, they are used to forecast the forthcoming pattern of the overall economy. Thus an LEI system is a significant area for the application of statistical methods in business and forecasting. A notable example is the Composite Leading Indicators (CLI) maintained by the Organization for Economic Cooperation and Development (OECD) and calculated for 29 OECD countries, 6 non-member economies and 9 zone aggregates.

Realizing its importance in the Philippines, the National Statistical Coordination Board (NSCB)[4] and the National Economic and Development Authority (NEDA)[5] jointly developed the Leading Economic Indicator System (LEIS) to serve as basis for short-term forecasting of the macroeconomic activity in the country.

The results of the quarterly computation of LEI are inputs to the Gross Domestic Product (GDP) forecasting work of NEDA and Bangko Sentral ng Pilipinas (BSP)[6]. The National Planning and Policy Staff (NPPS) of NEDA uses the LEIS, along with a consensus forecast, to benchmark forecast GDP from its internal forecasting

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[1] Paper prepared for the Third International Seminar on Early Warning and Business Cycle Indicators, Moscow, Russian Federation, 17-19 November 2010
[2] Secretary General, Statistical Coordination Officer VI, and Statistical Coordination Officer IV, respectively, of the National Statistical Coordination Board.
[3] *BusinessDictionary.com* http://www.businessdictionary.com/definition/leading-indicators.html#ixzz14xtak3pi
[4] The agency mandated to undertake the Philippine System of National Accounts (PSNA)
[5] The country's economic development and planning agency
[6] The country's central monetary authority whose primary objective is the maintenance of price stability.

model called the Quarterly Growth Indicators System (QGIS). The Department of Economic Statistics (DES) of the BSP, meanwhile, uses the values and quarter-on-quarter slopes of the composite LEI to generate a one-quarter ahead forecast of GDP that is used, among others, by the Monetary Board in inflation targeting. Needless to say, the LEI is a helpful tool used by our economic planners to track future movements of the economy.

While the LEI primarily aims to guide policy makers and planners, the NSCB continuously provides advocacy to the public and other probable users of the LEI[7].

LEI is also being used by the media in providing information to the public on the state of Philippine economy in the short run.

II. Development of the LEI in the Philippines

The development of LEI in the Philippines started through a joint project[8] of the Statistical Research and Training Center (SRTC) and NSCB in 1993 primarily to investigate whether business cycles exist and are reflected in the actual performance in the economy. The time frame used was the decade of the eighties, which was remembered for the occurrence of significant political events and series of natural calamities which had strong impact on the economy's performance. As indicated in the report, the result of the study was encouraging in terms of the continuous monitoring of the economy's business cycles and forecasting its upturns and downturns through leading economic indicators.

As part of a continuing effort by the Philippine Statistical System (PSS) to fully develop a leading economic indicator in the country, a research project was undertaken jointly by the NSCB and NEDA in 1996. The project was a component of the project entitled "Development of Short Term Forecasting Models for the Philippines" funded by the Canadian International Development Agency (CIDA). As a support of the project, the NSCB Executive Board approved NSCB Resolution No. 7 Series of 1996 "Approving The Action Plan On The Leading Indicator System Of The Philippines". The action plan aimed to operationalize and eventually institutionalize the

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[7] LEI was explained in simple terms in Statistically Speaking article "What LEIs Ahead? ...accessible at http://ns_webserver/headlines/StatsSpeak/2007/07907_rav_cisb_what_lies_ahead.asp

[8] Undertaken by a project team headed by Milagros O. de la Cruz and Teresita B. Devesa

system of LEI for the Philippines. In 1997, the compilation of the regular LEI report officially started[9].

In 2002, the NSCB again embarked on a project with a consultant[10] from the University of the Philippines School of Statistics (UPSS) to evaluate and strengthen the LEI of the Philippines. The study[11] produced a monthly database of potential indicator series, which provides for the possibility of having a monthly LEI. The series, however, is still short – 10 years of data or less.

III. Features and Computation of the Composite LEI

3.1 Leading economic indicators and the reference series

The computation of the composite leading economic indicator involves the use of a reference series and eleven leading economic indicators, namely: (1) consumer price index, (2) electric energy consumption; (3) exchange rate, 4) hotel occupancy rate, 5) money supply; 6) number of new business incorporations, 7) stock price index, 8) terms of trade index, 9) total merchandise imports, 10) tourist arrivals, and 11) wholesale price index. The definitions of these indicators can be found in **Annex A.**

The reference series used is the non-agriculture component of GDP, or the gross value added (GVA) of the industry and services sectors because the cycles of GDP and non-agriculture GVA (industry and services) show the same pattern. The cycle of the agriculture GVA when compared to the cycle of GDP, on the other hand, shows a different pattern.

The eleven indicator series were determined based on four criteria:
1. should represent and accurately measure important economic processes or variables;
2. should provide adequate coverage of the major sectors of the economy;
3. should be promptly available and not subject to large revisions, and;
4. should consistently lead and conform to business cycle movements.

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[9] To date, the NSCB regularly publishes LEI quarterly report accessible at http://www.nscb.gov.ph/lei/default.asp

[10] LEI consultant was Dr. Lisa Grace Bersales, former dean of the UP School of Statistics, University of the Philippines, Diliman

[11] The documentation of the study formed part of the paper "A Composite Leading Economic Indicators for the Philippines" presented during the 9th National Convention on Statistics (NCS) EDSA Shangri-la Hotel, Mandaluyong City, 4-5 October 2004

To quantify these criteria, the following statistical guides are used:

1. high correlation with reference series;

2. timely release of new values;

3. high data quality;

4. having small size revision to provisional data;

5. availability of long historical as well as high frequency data;

6. trends dominating the irregular component of the series or clear trends instead of high volatility are observed in the historical plots of the series;

7. consistency with the general upturns and downturns of the reference series; and

8. ability to lead turning points of the reference series

3.2 Computation of the Composite Leading Economic Indicator

The LEIS methodology includes the decomposition of the reference series and each of the eleven indicators by doing the following steps:

1. Seasonally adjust and smoothen using X11 ARIMA[12] to obtain the cycle-trend component for each of the eleven leading indicators and the reference series (non-agriculture component of the GDP). However, it has been recommended to consider other software for seasonal adjustments such as X12 ARIMA version of the US Bureau of Census and the TRAMO-SEATS of Spain[13].

Remove the trend component from the seasonally adjusted and smoothened series to obtain the cycle component of each of the indicators by using the Hodrick-Prescott (HP) Filter Method[14].

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[12] The NSCB also uses the X-11 ARIMA Software developed by Statistics Canada to seasonally adjust the time series of the National Accounts of the Philippines. ARIMA stands for AutoRegressive Integrated Moving Average.

[13] In 2002, the Statistical Research and Training Center (SRTC) conducted a research under the Re-engineering the Philippine Statistical Services Phase II Project to evaluate the different software for seasonal adjustment. Based on the evaluation, it recommended the use of Demetra software. The program is a combination of the X11 and X12 versions of the US Bureau of Census and the Tramo-Seats of Spain. The program is window-based and therefore, more user-friendly and attractive to non-specialists of seasonal adjustment. Demetra automatically detects difficult time series in huge data sets and subsequently assists the user in the seasonal adjustment. The software provides users of seasonal adjustment procedures the flexibility to choose between the two procedures (X-11/X-12 ARIMA and Tramo-Seats) and to make comparisons between these two leading approaches.

[14] Previously, obtaining the cycle component from the seasonally adjusted series was done by using estimated trend from a polynomial function of time. Starting with the Q1 2004 LEI estimate released on 12 February 2004, the computation of the LEI adopts a new detrending procedure called the Hodrick-Prescott (HP) Filter Method, which has effectively addressed observed limitations in the method used for the estimation of the LEI prior to 2004.

2. Correlate the cycle of each indicator with the cycle of the non-agriculture GDP (reference series) to obtain the lead period. The lead period determines the number of quarters the cycle series for each indicator is moved forward.

3. The index is computed as a linear combination of the indicators using the correlation coefficients of the indicators with the non-agriculture GDP as weights. In determining the relationship between the Non-agriculture GVA and the composite indicator, the following simple linear regression model is used:

$$\text{Non Agri GVA}_t = \beta_t \text{ LEI}_t + \varepsilon_t$$

where: Non agri GVA$_t$ = Cycle component of the Non-Agriculture GDP

β_t = Amount of increase in the cycle component of the Non-Agriculture GDP per unit increase in the composite LEI

LEI$_t$ = Composite Leading Economic Indicator

ε_t = Error term

IV. Issues and Limitations in the computation of the Composite LEI

It is recognized that the current pool of indicators should be reevaluated for possible addition/expansion or replacement to be able to capture structural changes that may have occurred in the economy, as some of the indicators may no longer be relevant.

Another is to address the issue on timeliness and availability of the indicators. In the desire of the NSCB to release the LEIS report two months before the end of the reference quarter to enhance its usefulness, indicators that are not yet available at the time of the LEI computation are imputed. The use of imputed/forecast data for the missing months or quarters leads to subsequent revisions which affect the reliability of the LEI.

Despite these limitations of the quarterly LEI, demands have been expressed for constructing monthly LEI.

V. Way Forward

Together with the active participation of different partners and stakeholders, the NSCB as the compiler of the LEI in the Philippines will undertake efforts to improve the system. These may include, but not limited to the following activities:

- Evaluation of the current set of indicator time series used in computing the LEI that would result in the possible expansion or reduction of the current number of indicators comprising the LEI. This task will involve working with the data producers to discuss how the series is generated, making suggestions on how to improve data quality and timeliness, and seeking agreement on the institutionalization of the regular provision of the data.

- Improvement in methodology in computing composite LEI using the expanded/reduced set of indicators.

- Enhancement of the composite LEI computation with sound statistical methods and concepts particularly on seasonal adjustment, regression and correlation, as well as analysis of the LEI. This could be done through enhancement of technical capacity through additional statistical training of NSCB technical staff involved in the compilation of LEI.

- Use of updated statistical package such as X12 ARIMA and TRAMO-SEATS of DEMETRA for seasonal adjustment and estimation of the Trend-Cycle component of the series. This shall be in anticipation of the possible use of the said procedure and software in the seasonal adjustment of official Philippine time series.

- Researching and learning about the leading economic indicator systems of other countries and/or international organizations.

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ACRONYMS

ARIMA	AutoRegressive Integrated Moving Average
BSP	Bangko Sentral ng Pilipinas
CIDA	Canadian International Development Agency
CLI	Composite Leading Indicators
DES	Department of Economic Statistics
GDP	Gross Domestic Product
LEIS	Leading Economic Indicator System
NCS	National Convention on Statistics
NEDA	National Economic and Development Authority
NPPS	National Planning and Policy Staff
NSCB	National Statistical Coordination Board
OECD	Organization for Economic Cooperation and Development
PSA	Philippine Statistical Association
PSS	Philippine Statistical System
QGIS	Quarterly Growth Indicators System
SRTC	Statistical Research and Training Center
UPSS	University of the Philippines School of Statistics

Definitions: The 11 Leading economic indicators

1. **Consumer price index (CPI)**
   Indicator of the change in the average prices of a fixed basket of goods and services commonly purchased by households relative to a base year *(NSCB Resolution No. 11, Series of 2003).*

   The computation of LEI uses the 2000 based CPI.

   Compiling agency: *National Statistics Office (NSO)*

2. **Electric energy consumption (ELECON)**
   Refers to the quantity of energy consumed measured in gigawatt-hours. It covers the consumption of residential, commercial, industrial, utilities/transport services.

   Compiling agencies: *Department of Energy (DOE)*

3. **Peso-Dollar exchange rate (EXCRATE)**
   Peso-Dollar rate refers to the guiding rate for the exchange of one U.S. dollar (the country's intervention currency) for pesos and is computed as the weighted average of all foreign exchange transactions done through the Philippine Dealing System (PDS) during the preceding day pursuant to Circular Letter dated July 30, 1992. The PDS allows authorized dealers of participating commercial banks and the BSP to deal in spot and forward foreign exchange trading using computer terminals right in their premises from 9:00 A.M. to 12:00 noon and from 2:30 to 4:00 P.M. daily *(http://www.bsp.gov.ph/statistics/glossary.asp)*

   Compiling agency: *Bangko Sentral ng Pilipinas (BSP)*

4. **Hotel occupancy rate (HOTOCC)**
   Number of rooms occupied for the month over the number of rooms available for sale for the month.

   Hotel occupancy rate as used in the LEI covers that of Metro Manila hotels only. The monthly hotel occupancy rate is computed as the overall average of the hotel occupancy rates of the four classes of hotels, namely, De Luxe Class, First Class, Standard Class and Economy Class.
   Compiling agency: *Department of Tourism (DOT)*

5. **Money supply - M1 (MONSUP)**
   Is defined under M.B. Res. 404 dated 14 February 1975 as consisting of currency in circulation and peso deposits subject to check of the monetary system.   Also   called   Narrow   Money (*http://www.bsp.gov.ph/statistics/glossary.asp*)

   Real money supply is used in the LEI and is computed as the ratio of money supply M1 over CPI multiplied by 100.

   Compiling agency: *Bangko Sentral ng Pilipinas (BSP)*

6. **Number of new business incorporations (NEWBUS)**

Total of new corporations and partnerships with initial paid-up capital registered with the Securities and Exchange Commission (SEC) during the reference month. The quarterly data is obtained by summing the monthly data.

Compiling agency: *Securities and Exchange Commission (SEC)*

7. **Stock price index (STKPRC)**
Philippine stock price index (SPI) serves as a measure of the changes in, and the movements of, the average prices of company shares of stock traded in the Philippine Stock Exchange (PSE).
(*http://www.bsp.gov.ph/statistics/glossary.asp*)

Compiling agency: *Bangko Sentral ng Pilipinas (BSP)*
Source of basic data: *Philippine Stock Exchange (PSE)*

8. **Terms of trade index (TTRADE) for Merchandise Goods**
The ratio of export price index to the import price index. It measures the changes in the prices received for exports relative to the prices for imports. (*NSCB Technical Notes on the Estimates of the Philippine System of National Accounts Series 2004-Q2)*

Formula used:

$$\text{Terms of Trade Index} = \frac{\text{Merchandise Export Price Index}}{\text{Merchandise Import Price Index}} \times 100$$

where;

$$\text{Merchandise Export Price Index} = \frac{\text{FOB value of merchandise exports at current price}}{\text{FOB value of merchandise exports at base year prices}} \times 100$$

$$\text{Merchandise Import Price Index} = \frac{\text{CIF value of merchandise imports at current price}}{\text{CIF value of merchandise imports at base year prices}} \times 100$$

Compiling agency: *National Statistical Coordination Board (NSCB)*

9. **Total merchandise imports (IMPORTS)**
Goods coming from foreign countries through a seaport or airport of entry and properly cleared by the Bureau of Customs or remaining under its control, whether these are for direct consumption, merchandising, warehousing, or further processing.

Compiling agency: *National Statistics Office (NSO)*

10. **Tourist/visitor arrivals (TOURAR)**
Visitor - Any person traveling to a place other than that of his/her usual environment for less than 12 months and whose main purpose of trip is other than the exercise of an activity remunerated

from within the place visited. *(NSCB Resolution No. 11 Series of 2003)*

The visitor arrival data used in the LEI pertains to the volume of inbound visitors or the non-resident visitors traveling within the economic territory of the country.

Compiling agency: *Department of Tourism (DOT)*

11. **Wholesale price index (WPI)**
    Statistical measure of average changes over time in the wholesale prices of commodities relative to a base year *(NSCB Resolution No. 11, Series of 2003).*

    The computation of LEIS uses the 1998 based WPI.
    Compiling agency: *National Statistics Office (NSO)*