

# A Real-Time Leading Indicator for the US Economy

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## 1. About Leading Indicators

The composite leading indicator is an analytic method designed to provide earlier signals of the peaks and troughs in the business cycle of the economy, industry or company.

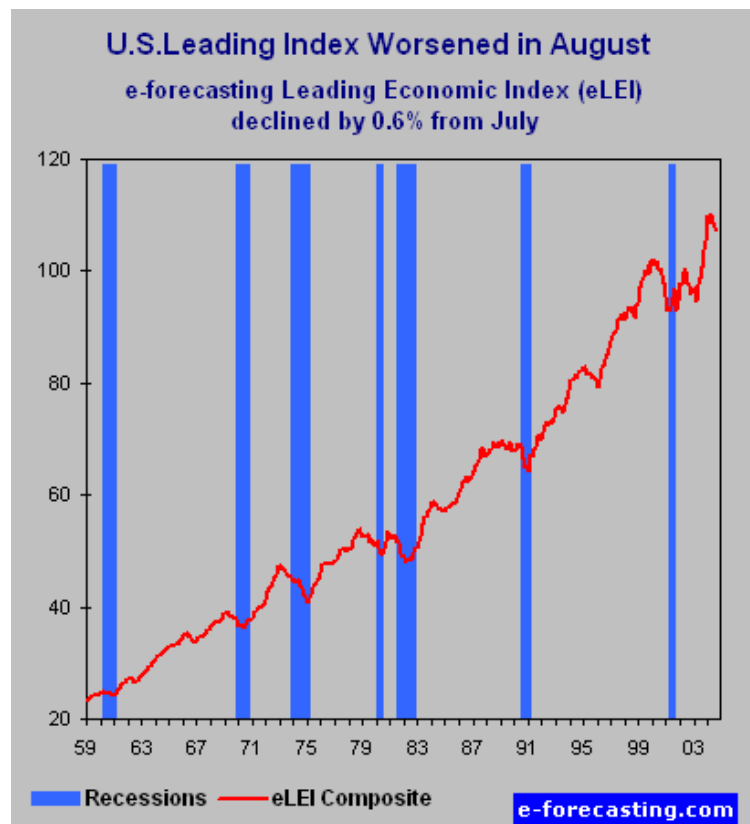
It is constructed to summarize and reveal common turning point patterns in economic data in a clearer and more convincing manner than any individual component—primarily because it smoothes out some of the volatility of individual components.

A change in direction in the leading indicator does not signal a cyclical turning point unless the movement is of significant size, duration, and scope. The main value of the leading index is in signaling that either the risk of a recession has increased or that a recession may be coming to an end.

It is often stated in the press that three consecutive downward movements in the national leading index signal a recession. This is a simple, inflexible rule. The January 1997 issue of *Business Cycle Indicators* discusses how a 1% decline in the national leading index, coupled with declines in a majority of its components, provides a reliable, but not perfect, recession signal.

## 2. e-forecasting's Leading Economic Index- eLEI

In September 2004, we launched our US composite leading economic index; named **e-forecasting's Leading Economic Index (eLEI)**. By the use of faster information processing techniques and advanced data analysis methods, our research team has canvassed the world economic and business databases to find reliable, consistent and timely leading indicators for inclusion into a new composite leading index that provides earlier than ever a glimpse of the future direction for the US economy.



### 3. Is there a need for another leading indicator?

There are two 'traditional' highly respected and widely-used leading economic indicators for the American economy: The Conference Board's Leading Economic Indicator (LEI) and OECD's Composite Leading Indicator (CLI). Despite their recent upgrades and improvements, both leading indicators still lack agility, a prerequisite for nimble business decision-makers and policy designers. In particular, traditional indicators are subjected to three weaknesses:

**Timeliness.** They are hampered by publication lags of two to three months. For example, on September 22, the available reading for the Conference Board's leading indicator is for July; On August 6, OECD released the June reading of their US leading index.

**Forecasting Errors and Revisions.** For components that data for the most recent complete month are not available, one-month ahead forecasts are generated and revised the following month when real data become available. These built-in revisions, also called forecast errors, combined with revisions from official data sources add uncertainties and risks in using the traditional leading indicators.

**Coverage.** They do not include components that reflect fundamental changes in the economic structure such as technological change and globalization, the two most important forces that have shaped the business cycle.

### 4. eLEI: Using today's instead of yesterday's eye on the future

Indicator agility was the goal in building eLEI for the US economy. As a result, eLEI provides a unique real-data and real-time predictive intelligence tool useful to our clients. Four key advantages make eLEI an indispensable tool for short-term predictions:

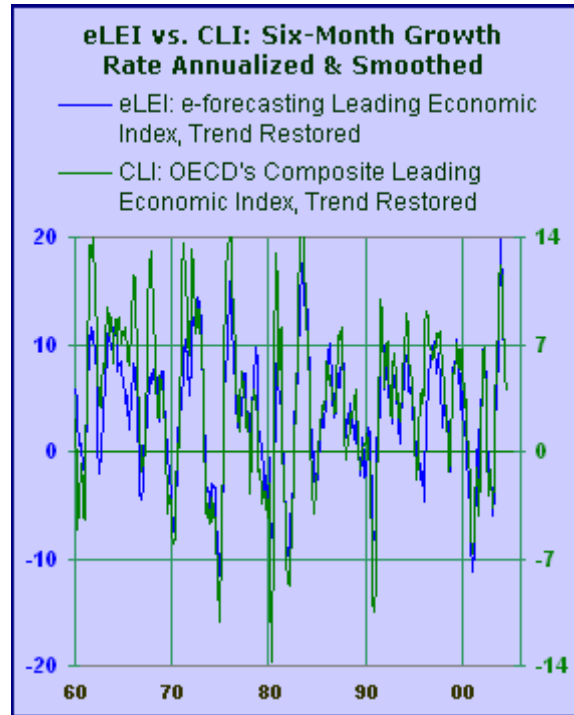
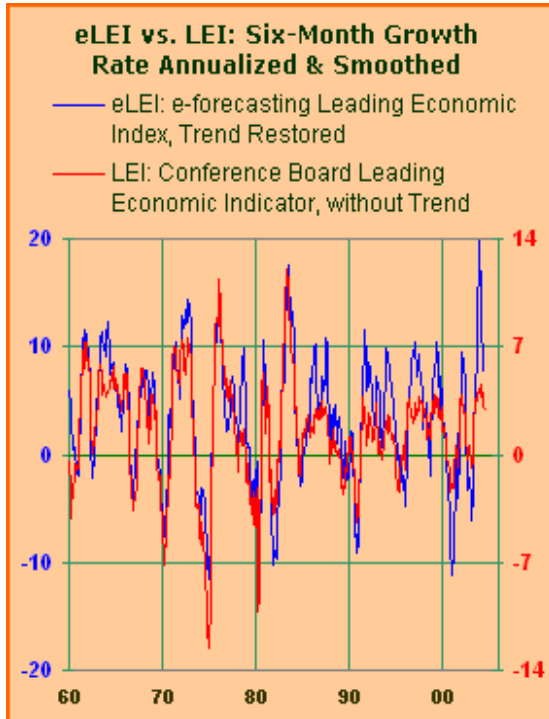
**It is fast.** eLEI is available the first business day of each month providing a reading of the previous month, just hours after the month's closing. That, by definition of monthly analysis, makes eLEI a real-time leading indicator.

**It is factual.** All data of all components comprising eLEI are real, complete and never revised. Our analysis to clients never includes statements such as "the leading index went up if our forecast is good," which defeats the purpose of having leading indicators.

**It is modern.** eLEI's includes two 'new' components covering the areas of technology and globalization that undoubtedly have been driving the U.S. business cycle. In particular, eLEI is a composite index of seven forward-looking components each representing the following economic areas: financial markets; stock market; technological change; consumers; construction; manufacturing; and foreign demand.

**It is first.** As a real-time indicator, our innovative eLEI has a 'natural' two to three month leading advantage over the untimely traditional leading indices. It represents the first indication of the future direction of the U.S. economy.

**It is reliable.** Back-tested it to 1959, eLEI predicts turning points for the US business cycle as good as the traditional leading indicators offered by the Conference Board and OECD. The charts below track a historical comparison between our eLEI, Conference Board's LEI and OECD' CLI using the six-month smoothed annualized growth rate so the performance on turning points could be easily detected.



**The bottom line.** Although traditional leading indicators and our eLEI are equally good in providing early warnings on the future direction for the US economy, decision-makers who “watch” our real-time eLEI are two months ahead of the curve from those who look at the past readings of traditional leading indicators.

## 5. Methodology

The procedure for calculating the composite indexes has five distinct steps. In the notation below, X refers to an individual component; subscripts [t] and [t-1] refer to the current and prior month respectively. Also, N represents the number of components; the sum over all components for any month is indicated by  $\Sigma$ .

**Step 1. Month-to-month changes are computed for each component.** If the component X is in percent change form or an interest rate, simple arithmetic differences are calculated:

$$g_t = X_t - X_{t-1}.$$

If the component is not in percent change form, a symmetric alternative to the conventional percent change formula is used:

$$g_t = 200 * (X_t - X_{t-1}) / (X_t + X_{t-1}).$$

**Step 2. Weighting.** The month-to-month changes are adjusted to equalize the volatility of each component. Standard Deviations,  $SD_x$ , of the changes in each component are computed. These statistical measures of volatility for each component are first inverted

$$V_x = 1 / SD_x$$

Then, their sum over all components,  $K$ , is calculated

$$K = \sum V_x$$

To give equal weight to each component's standardized change, the weight for each component,  $W_x$ , is given by

$$W_x = V_x / K$$

And, all weights sum up to one, i.e.  $\sum W_x = 1$

The adjusted change in each component is the month-to-month change multiplied by the corresponding component's weight

$$m_t = W_x * g_t$$

**Step 3. Aggregation.** The symmetrical percent change for the composite,  $c_t$ , is the sum of the weighted for volatility percent change in the components

$$c_t = \sum m_t / Z$$

Where  $Z$  is a trend adjustment factor for the composite index. If  $Z=1$ , the average trend in the leading index is the weighted sum the average growth rate of its components.

**Step 4. Index Generation.** The level of the leading index with no trend adjustment,  $INT$ , is computed using the symmetric percent change formula. Setting  $Z=1$ , the first month's value is

$$INT_1 = 100.$$

The second month's value is

$$INT_2 = INT_1 * (200+c_2) / (200-c_2)$$

And, this formula is used recursively to compute the index levels for each month that data are available.

**Step 5. Trend adjustment.** This step adjusts the long-run growth in the leading index to the economy's long-term growth, measured by the growth rate in real GDP. Denoting the average of symmetrical % changes for the history of the composite  $INT$  and for real GDP by  $AS\%\Delta$ , the trend adjustment factor,  $Z$ , is then computed as

$$Z = AS\%\Delta (INT) / AS\%\Delta (\text{real GDP})$$

Setting  $Z$  equal to its value resulting from the computed trends, each month's symmetrical percent change for the composite in Step 3 becomes trend-adjusted and the composite with trend-restored is recomputed as in Step 4.

**Step 6. Rebasing.** The index is rebased to average 100 in 2000. The history of the index is multiplied by 100 and divided by the average for the twelve months of 2000.