Forecasting Turning Points With Leading Indicators

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A major topic of current interest to economists is whether the U.S. economy is headed for recession in the near future. Some have concluded that recession is on the horizon, or has already begun. One piece of evidence offered to support that view is the Composite Index of Leading Indicators (ILl), which reached a peak in January 1989, and by mid-August was reported to have fallen in four of the last five months.

Generally speaking, a major task in economic forecasting is to anticipate turning points in economic activity - points when a business expansion will reach its zenith, or peak, or when a business contraction will reach its nadir, or trough. A reliable method for forecasting turning points has continued to elude forecasters, despite advances in mathematical and statistical techniques. The financial news media frequently refer to "leading" indicators of economic activity as clues, if not predictors, of changes in activity. The media commonly report the magnitude of an increase or decline in the ILl, which, they conclude, implies continued economic expansion, or contraction in economic activity. A surge in the ILl, and the Composite Index of Leading Indicators (ILl) as proof of impending growth or contraction in economic activity. A closer look indicates, however, that while the ILl can provide a great deal of useful information, its value as a forecasting tool is limited. Its usefulness increases when it is used in combination with other indexes.

The financial news media frequently point to the movement of the Composite Index of Leading Indicators (ILl) as proof of impending growth or contraction in economic activity. A closer look indicates, however, that while the ILl can provide a great deal of useful information, its value as a forecasting tool is limited. Its usefulness increases when it is used in combination with other indexes.

From among the leading indicators originally selected by the NBER, the BEA selected the 12 best on the basis of six criteria: economic significance; statistical adequacy; timeliness at troughs and peaks of aggregate economic activity; conformity to past business expansions and contractions; smoothness; and frequency and timeliness. The 12 individual series were combined into a composite index, which was first published in November 1968.

The BEA has revised the list of components of the composite index from time to time, as the usefulness of some series waned, and new or improved series became available. The composition of the ILl was last changed in January 1989 and now includes 11 series.

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The ILl as a Forecaster of Business Peaks

Three gaps of two months each. Excluding those gaps, there was an uninterrupted lead of nine months. The 15-month lead before the January 1980 peak includes a gap of two months and three gaps of one month each. Excluding those gaps, there was no lead.

A forecasting rule using the ILl must specify how many months of decline constitutes a signal of a business peak, while also taking into account interruptions in the downward movement of the index. An example of such a rule is that the ILl is forecasting a recession if the index falls in four out of six months. That rule would have yielded false signals in 1955, 1964, 1964, and 1987, and would have failed to forecast the peak of July 1981.

Any forecasting rule based on the ILl must accept some trade-off between false signals and failures to forecast a business peak. We tested several rules based on the experience of the last 42 years. The least restrictive rule that would not have given any false signals is that the ILl must fall for 10 consecutive months. However, with that rule, the ILl would have failed to anticipate all of the peaks. The least restrictive rule that would have given all of the peaks is that the ILl must fall in four out of seven months. With that rule, the ILl would have given four false signals.

Considering failure to forecast a peak, and a false signal of a peak, as equally egregious errors, two rules appear to minimize the total errors. One is that a recession is forecast if the ILl falls in any of four of seven months. The other rule uses a test of falling in any four of eight months. Both rules would have made four errors, giving four false signals. However, neither would have failed to forecast any business peak.

The first of the two rules seems preferable because it provides a longer average warning time and has a shorter average duration of false signals.

Another shortcoming of the ILl is the variability of its warnings of business peaks. As reckoned by the BEA, the ILl peaks from two to 20 months before a business peak. What is more relevant is the range in length of the periods between the time the ILl signals an impending business peak and the peak itself. The rule selected here is the one of basing minimum forecasting errors provides leads ranging from one to 14 months.

This analysis indicates that any statement suggesting that the ILl always turns down before the economy turns down will be true, but misleading. It is misleading because it implies that the ILl can be used to forecast business peaks, when in fact the index is quite unreliable for that purpose. Any forecasting rule based on the ILl will give either some false signals of business peaks, or will fail to forecast a peak, or will do both. Moreover, the correct forecasts exhibit highly variable lead times.

The most accurate rule identified in this analysis can be said to offer the following guidance to an analyst using the ILl to help forecast the next business peak: If the ILl has declined in four of the last seven months, the chances are two out of three that a business peak will occur sometime in the next 14 months.

The foregoing analysis uses a historical series for the latest composition of the ILl, calculated after all of the revisions of the basic data had been made. However, when using the ILl as an index, an analyst first receives an unreviewed figure for the ILl for a particular month. That figure could then be reviewed in each of the next five months, which adds to the uncertainty confronting the analyst. Consequently, the possibility of false signals and failures to forecast might be even greater than is implied by this analysis.

Finally, this analysis assumes that the ILl is available during the month for which it is issued. In fact, it is published about four or five weeks following the end of the month. Therefore, the ILl gives forecasters that much less lead time.

The ILl as a Forecaster of Business Troughs

The ILl has turned upward prior to each of the last eight business troughs. By checking the BEA, the spans between the low points of the ILl and the troughs of business cycles are as follows: four months, seven months, seven months, nine months, seven months, six months and nine months, nine months, and seven months, respectively. For six of the eight troughs, the span was from one month to six months.

Unfortunately, it is not uncommon for the ILl to give a false signal of a trough. In six of the eight contractions, the ILl gave a false signal by rising and then declining again. For example, in the 1960-1961 recession, the ILl rose in five consecutive months following the business peak but then flattened for three months, after which the time could have been interpreted as signaling that a trough was at hand. Again, during the 1981-1982 recession, the ILl advanced in four months of a six-month period and then declined, before rising again to signal an impending end to the recession.

A rule that a one-month rise in the ILl forecasts a trough is clearly too stringent because it would have given false signals in six of the eight recessions. A rule with a three-month-consecutive-month criterion is probably too strict, because while it would have given no false signals, it would have failed to anticipate the troughs in 1958, 1970, and 1980.

The rule that seems to balance best the risk of the two types of error states that two consecutive rises in the ILl forecast a business trough. That rule would have given false signals and would have failed to forecast the troughs of 1970 and 1975. The forecasts of impending troughs given by the ILl, by the two-consecutive-month rule would have preceded the troughs by periods ranging from one month to nine months, and averaging 4.7 months.

Thus, the foregoing analysis can be said to have given two false signals and to an analyst using the ILl to help forecast the end of a recession: If the ILl has risen for two consecutive months, the experience of the last 42 years suggests that the chances are three to one that a trough will be reached in the next one to nine months. But if the ILl has not risen in both of the last two months, the analyst must nevertheless keep in mind that the rule has failed to forecast two of the last eight business troughs. If the ILl has risen for three consecutive months, the experience of the last 42 years suggests that a trough will be reached within the next six months or has already occurred within the last two months.

Forecasting Business Peaks Using Other Indexes in Combination With the ILl

In addition to the ILl, three other composite indexes of leading indicators are published in Business Conditions Digest. They are the ratio of the Composite Index of Coincident Indicators to the Composite Index of Lagging Indicators (the Ratio), the Long-Leading Index, and the Short-Leading Index. Rules based on these measures have the same shortcomings as the ILl: a rule stringent enough to predict all business peaks will also give false signals, and a rule strict enough to avoid false signals will fail to forecast most of the peaks. If four declines in the last seven consecutive months is considered a forecast of a business peak, the three alternative indexes would have forecast all of the last eight peaks, with one exception: the Short-Leading Index would have failed to forecast the July 1981 peak. However, the Ratio, the Long-Leading Index, and the Short-Leading Index would have given seven false signals, five, and eight times, respectively.

Despite the shortcomings of the alternative indexes, analysts can improve their forecasts to some extent by using the alternative indexes in conjunction with the ILl. A rule for doing so is to say that the ILl is forecasting a peak only when two conditions are met: (1) the ILl has declined in four of the last seven months, and (2) at least two of the alternative indexes also signal a peak by the same four-out-of-seven test.

Using that rule, the ILl would have forecast all eight peaks. The average lead time falls slightly to 4.4 months from the 5.6 months obtained by using the ILl alone. However, the range of lead times is narrowed to one to nine months from the 14 months, thereby reducing the uncertainty about when the peak will arrive.

The rule also would be somewhat better in that it would have given false signals instead of the four that are given by forecasting with the ILl alone. The false signal of a business peak following the stock market collapse in October 1987 would have been avoided. The rule does not reduce the nine-month average duration of the false signals.

Forecasting Business Troughs Using Other Indexes

We used two rules to examine the forecasting accuracy for business troughs of both the ILl and the alternative indexes. Because recessions have been much shorter than expansions, the forecasting rules can be much simpler than those used to forecast peaks. The two rules tested are (1) a one-month rise in a month to signal a trough, and (2) rises in two consecutive months to forecast a trough.

The Long-Leading Index with the two-month rule would have given the best performance during the last eight recessions in terms of the number of correct forecasts. It forecast all eight troughs and gave only one false signal. Its range of lead times, one to nine months, is wider than that of the three alternative indexes, but that greater variability seems a small price to pay for its much greater forecasting reliability.

Thus, the Long-Leading Index appears to give superior results, which gave two false signals and failed to forecast two troughs with the two-month rule, and gave seven false signals with the one-month rule. The three alternative indexes are much less reliable measures for forecasting troughs, making 10 and nine errors, respectively, with the one-month rule, and five and