

INDICATOR APPROACH TO BUSINESS CYCLE ANALYSIS

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_____ Business cycle indicators have proven to be useful tools for analyzing alternating sequences of economic expansions and contractions known as business cycles. Wesley C. Mitchell and Arthur F. Burns originated the indicator approach that made extensive use of business cycle indicators in the mid-1930s at the NBER. Interpretation of business cycle indicators, and in particular the composite leading index, is more complex than simple graphs can convey. It is important to recognize that the U.S. economy is continually evolving, and is too complex to be completely summarized with just a few economic series or statistics.

1. HOW BUSINESS CYCLE INDICATORS ARE SELECTED

Cyclical indicators are classified into three categories - leading, coincident, and lagging - based on the timing of their movements. Coincident indicators, such as employment, production, personal income, and manufacturing and trade sales, are broad series that measure aggregate economic activity; thus, they define the business cycle. Leading indicators, such as average weekly hours, new orders, consumer expectations, housing permits, stock prices, and the interest rate spread, are series that tend to shift direction in advance of the business cycle.

For this reason, they get their share of the attention. Nevertheless, it is important to recognize that leading indicators are more meaningful when used within the framework of a system of cyclical indicators—including coincident and lagging indicators that define and describe business cycles. The lagging indicators, in contrast to the leaders, tend to change direction after the coincident series. Therefore, the lagging series would seem to have little practical value on the surface—indeed, they are often dismissed as inconsequential. To do so, however, ignores vital information about the business cycle process.

The record of the leading index is more variable, and lead times at peaks tend to be longer than at troughs. The leading index has led cyclical downturns in the economy by eight to 20 months, and recoveries by one to ten months. The greatest variance is seen in the relationship between turning points in the lagging index and the general economy. However, the chart of the ratio of the coincident index to the lagging index shows that this ratio anticipates both peaks and troughs. A sharp decline in the ratio signals a large increase (relative to the change in the coincident index) in the costs of doing business, which occur late in an expansion, and are represented by the lagging index. Indeed, the ratio of the coincident to lagging index had rather long leads of between eight and 11 months of business cycle peaks from 1970 to 1990. This pattern is not a fluke. The lagging indicators tell us when structural imbalances are developing within the economy. The inventory-sales ratio, for example, tells us when inventories are rising faster than sales, suggesting that a dangerous overhang of stocks is accumulating on sellers' shelves. Another lagging indicator, rising interest, suggests a squeeze on the availability of credit. Both of these events are typical ingredients from which recessions are made.

2. DIFFUSION INDEXES

Diffusion indexes provide another source of useful, but often neglected, information about the business cycle. They tell us how widespread a particular business cycle movement (expansion or contraction) has become, and measure the breadth of that movement. Diffusion indexes measure the number of components that are increasing in any given month. For example, since the leading index has ten components, a diffusion index value of 70 would indicate that seven of the ten components were rising. A diffusion index of zero would indicate that all ten fell. The BCI database includes diffusion indexes over two different time spans, one month and six months, for the components of the leading, coincident, and lagging indexes, and for employment in 356 industries. The one-month span indexes tend to be erratic, while signals from six-month diffusion indexes are much more reliable.

Diffusion indexes are not redundant even though they are based on the same set of data as the composite indexes. On occasion, they move in different directions. A composite index differentiates between small and large overall movements in the component series, while a diffusion index measures the prevalence of those general movements. The difference is often very useful when attempting to either confirm or predict cyclical turning points.

3. THE INDEX OF LEADING INDICATORS

The oldest, and also the simplest, way to forecast business cycles is to identify a group of variables that are leading indicators of aggregate output and use these to predict turning points in the business cycle. Beginning in 1937, the Commerce Department began to report the Composite Index of Leading Indicators. Since that time, this index has undergone substantial revision and many variables have been added or removed over the years.

Table 1 shows the current variables that comprise the Composite Index of Leading Indicators. Notice that there are variables included in this index for proponents of every business cycle theory. Classical or Real Business Cycle economists get average weekly hours and vendor delivery speed (slower speeds indicate that capacity constraints are becoming binding). Keynesians get consumer expectations, the stock market, new housing starts (a volatile component of investment), manufacturer orders, and unemployment claims. Monetarists get M2 as well as another measure of the tightness of monetary policy, the interest rate spread between long term T-bonds and the short-term federal funds rate (which is the overnight interest rate on interbank loans).

Table 1 The Index of Leading Indicators and Its Components

1	Average weekly hours of manufacturing production workers (Average weekly hours)
2	Average weekly initial claims for unemployment insurance, state programs-inverted scale (Initial unemployment claims)
3	Manufacturers' new orders for consumer goods and materials, in constant dollars (Manufacturers' orders)
4	Vendor performance (percentage of companies receiving slower deliveries)
5	Manufacturers' new orders for nondefense capital goods industries, in constant dollars (Manufacturers' capital orders)
6	New private-housing units authorized by local building permits (Housing starts)

7	Prices of 500 common stocks, index (Stock market price indexes and dividend yields)
8	Money supply (M2), in constant dollars (Money supply)
9	Interest rate spread, 10-year Treasury bonds less federal funds (Interest rates)
10	Consumer expectations, index (Consumer attitude indexes)

Source: The Conference Board, Business Cycle Indicators Handbook, New York, 2000, pp. 59, available online at www.tcb-indicators.org

A larger interest rate gap indicates that the Fed's policy is expansionary and is pushing down the short-term federal funds rate while at the same time increasing future expected inflation and increasing long-term interest rates. Thus, decisions regarding which macroeconomic variables to include in this index are not based upon one specific theory. Instead, the Index of Leading Indicators focuses on what works, meaning the variables that are the most reliable leading indicators of output.

Numerous empirical studies have been conducted investigating the forecasting effectiveness of the Composite Index of Leading Indicators. Francis Diebold and Glenn Rudebusch [1] review many of these studies and reach the general conclusion that the index is not a reliable indicator of business cycle turning points. Even when used in conjunction with other forecasting methods, the Composite Index of Leading Indicators does little to improve the accuracy of macroeconomic forecasts, especially in terms of identifying the peaks and troughs of business cycles.

4. FORECASTING RECESSIONS USING THE INDEX OF LEADING ECONOMIC INDICATORS

Prior to 2001, the leading index for a particular month was typically available about five weeks after the month's end. The new index procedure implemented by The Conference Board addresses this issue, and provides a timelier index. However, the fact is that peaks (or even troughs, for that matter) cannot always be recognized until months after they occur, especially during periods when the data are subject to significant revision. Therefore, a considerable amount of research has focused on finding a real-time turning point rule, which provides adequate warnings. Unfortunately, it is imprudent to forecast a recession using a simple and inflexible rule.

The U.S. economy is continually evolving, and is far too complex to be summarized by one economic series. Even official recession dates for the U.S. economy are determined by a committee of prominent economists that uses a multitude of indicators rather than a simple rule.

Predicting these turning points is a difficult task even for the best forecasters. In practice, economists and analysts apply rules of thumb to help identify recent turning points and a coming recession. These criteria provide guidelines for interpreting movements in the composite indexes, and for identifying turning points in order to assess the risk of a recession in the short term. For example, three consecutive monthly declines of the leading index appear to be correlated with declines in overall economic activity. This observation has led to the formulation of the long-standing rule of thumb that a three-month decline signals a recession. It is important to emphasize, however, that students of business cycles must consider a variety of factors when interpreting cyclical indicators, and never rely on individual data series or simple rules.

4. INTERPRETING DECLINES IN THE LEADING INDEX: THE THREE D'S

A practical outcome of business cycle research is a roadmap of the economy over the next six to twelve months. Clearly, knowing whether or not that map contains the pitfalls of a recession is important. But what is also important is to know the direction the economy will take in coming months. That is why interpreting cyclical downturns, whether or not they result in a recession, is of significance.

This section focuses on the risk assessment of an approaching recession, but similar arguments can be made to predict recoveries at the end of recessions as well. Looking at data month by month, it is clear that the leading index has many brief declines that have nothing to do with cyclical downturns in the economy. Indeed, if economists took every one- or two-month decline in the index seriously, they would be forecasting a recession several times each year.

How can one determine, then, when weakness in the leading index represents a true signal of recession ahead rather than just an inconsequential blip in the data? One useful approach is to examine the "Three Ds" - the duration, depth, and diffusion of the leading indicators. The longer the weakness continues, the deeper it gets; and the more widespread it becomes, the more likely a recession will occur. It is not sufficient to draw conclusions based on a single rule. However, in practice, simple rules based on one or more of the Three Ds can provide guidelines to interpret and summarize the complex set of interactions and linkages among the cyclical indicators. Thus, using duration, depth, and diffusion, in conjunction or individually, provides the business cycle economist with a lexicon to interpret the vast amount of information gathered from many aspects of the economy, and to assess the likelihood of a recession or recovery.

The leading index does not increase or decrease in long continuous movements. Expansions are interspersed with occasional months of decline, and recessions include months of increase. Regardless, interpreting declines in the leading index using duration facilitates the emergence of short-term patterns or trends. The depth and diffusion of those declines help discern how likely a short-term fluctuation is to be a recession warning. This motivates the use of the Three Ds in conjunction with one another.

The duration of a decline is perhaps the most obvious indication of imbalances in the economy, which might eventually enter a recession as a result. However, for reliable interpretation of these declines, most economists also require a significant downward movement in the index, as well as declines in the majority of the component series. These are the second and third aspects of the Three Ds - depth and diffusion, respectively. Simply put, the greater the decline (depth), the more likely it is that a serious economic downturn will occur, and the more likely that the decline is not a random fluctuation. By calculating the percent change of the decline over a given span of months, the seriousness of the decline can be assessed. Also, a decline caused by a dramatic fall in just one of the ten components of the leading index may not be serious, but the same percentage decrease caused by seven or eight components falling might be.

5. MARKET-BASED INDICATORS

Instead of relying on a composite of various macroeconomic indicators, many economists believe that market-based indicators of turning points in the business cycle are more reliable because they more accurately reflect the prevailing perceptions of those actively

playing a role in future economic performance. The stock market is one such indicator, stock market variability literally dwarfs the variability of output growth and is so filled with false signals that it cannot be a reliable indicator by itself.

Another more reliable market-based indicator is the yield curve. A yield is a measure of the yearly return on holding an asset, typically a bond. It is calculated by determining the interest rate that equates the present value of future payments received from the bond with the current price that the bond is selling at. One of the important determinants of the yield on various bonds is the risk of that bond. In order to assume higher risk, a purchaser will demand a higher yield. The risk of a bond rises with the default risk of the firm issuing the bond. The risk of a bond also rises as the length of time until the bond's maturity, or the time at which the bond's principle is repaid, increases. Longer maturities mean more risk, both because the probability of default is larger over longer periods of time and also because the owner is exposed to more risk from large changes in market interest rates that could reduce the attractiveness of the bond on the secondary, or resale, market.

A widely accepted theory about how maturity affects the yields on bonds is the expectations hypothesis. This theory asserts the following relationship between long-term and short-term yields: The yield on a bond with n years to maturity should be equal to the average return from holding n number of 1-year bonds plus a premium to compensate the investor for the fact that the longer-maturity bond is riskier. Thus, the yield on a 5-year bond should be the average of the yields from holding five 1-year bonds plus an extra return to encourage the investor to accept the higher risk of holding a 5-year bond.

A yield curve is a representation of how the yields on comparable bonds change as their maturity changes. Yield curves are usually calculated using government bond yields. According to the expectations hypothesis, the slope of the yield curve provides a clear indication about what the market expects to happen to short-term interest rates in the future. If short-term interest rates are expected to remain constant in the future, the yield curve should have a gradual upward slope because of the risk premium. If short-term interest rates are expected to rise in the future, then the yield curve should slope upwards very steeply. If short-term interest rates are expected to fall in the future, then the yield curve should be flat or downward sloping.

What role can yield curves play in economic forecasting? There is a strong rationale for thinking that an inverted (or possibly flat) yield curve is a market-based signal of a future recession. The reason is that short-term interest rates are strongly procyclical in the empirical data. This is in part because investment demand and inflation are procyclical and in part because countercyclical monetary policy makes short-term interest rates procyclical. As a result, if an accurate measure of future short-term interest rates can be obtained, then a good indicator of future output growth has also been found. An expected decline in short-term interest in the future as evidenced by an inverted or flat yield curve likely indicates that markets are also expecting a decline in output growth.

A few studies have been conducted evaluating the forecasting power of yield curves. For example, Joseph Haubrich and Ann Dombrosky [3] measured the slope of the yield curve by calculating the interest rate spread between the 10-year T-Bond and the 3-month T-Bill. They found that during the last 30 years there has been a strong correlation between this interest rate spread and GDP growth one year in the future. In fact, yield curve-based forecasts do better than other more complex forecasting methods. However, during the last 10 years the yield curve has not performed as well, raising questions about whether a longer period of time is needed to accurately assess its forecasting effectiveness. Arturo Estrella and

Frederic Mishkin [2] also found evidence that the slope of the yield curve outperforms a wide variety of other market - and nonmarket-based macroeconomic indicators such as the stock market, monetary aggregates, and the Index of Leading Indicators.

Thus, there are many reasons to believe that market-based leading indicators such as the yield curve may be important tools in accurately forecasting business cycle turning points. From an economist's point of view, they are certainly a more reliable measure of expectations than survey data, such as the Consumer Confidence Index, because they are market driven and not subjective. However, one big drawback of yield curves is that interpreting them is somewhat subjective. How flat does a yield curve have to be before it is clearly indicating a future recession? How steep does a yield curve have to be before it clearly signals an expansion? These are important questions that have not yet been fully addressed empirically. Other market-based indicators may also be useful to forecasters.

CONCLUSIONS

Interpretation of business cycle indicators, and in particular the composite leading index, is more complex than simple graphs can convey. It is important to recognize that the U.S. economy is continually evolving, and is too complex to be completely summarized with just a few economic series or statistics. Although prior business cycles have shown patterns that are likely to be repeated to some degree and should be watched when predicting turning points, recessions can start and end - sometimes very quickly - for a variety of reasons. Moreover, economic expansions and contractions are not periodic and symmetric. Just as economists continue to debate the relative importance of the various factors that affect aggregate demand and supply - such as monetary policy, oil price shocks, and business confidence - and the manner in which business cycles are propagated, so there is often a wide range of opinion among forecasters about the most likely trend for the economy.

These complications confound our ability to quickly perceive the development of a turning point in the economy. Nonetheless, thoughtful and pragmatic analysis of the cyclical indicators yields important information about the business cycle. The indicator approach is useful, because it provides an earlier signal of a turn in the economy than can reliably be found by using other analytical approaches. This section provides only a brief sketch of the indicator approach. It is hoped that it will encourage readers to explore the original sources.

While econometric models and leading indicators do a good job predicting growth during stable economic periods, they are very poor predictors of turning points in the business cycle and generate large and persistent errors when there are major economic shocks such as the oil price shocks of the 1970s or the strong productivity growth of the 1990s. Yield curves might be more reliable indicators of business cycle turning points, but at this point interpreting yield curves is more of an art than a science. The use of yield curves in forecasting needs further study before it can completely gain forecasters' confidence. The same holds for dynamic general equilibrium models, which are attractive from a theoretical standpoint and widely used in academic research but have generated little excitement among commercial forecasters because of their complexity and unreliable performance.

REFERENCES:

[1] Diebold, F. X., Rudebusch, G. D., Business Cycles: Durations, Dynamics, and Forecasting. Princeton: Princeton University Press, 1999.

[2] Estrella, A., Mishkin F., Predicting U.S. Recessions: Financial Variables As Leading Indicators, Review of Economics and Statistics, Vol 80, No. 1, 1998.

[3] Haubrich, J. G., Dombrosky, A. M, Predicting real growth using the yield curve. Federal Reserve Bank of Cleveland Economic Review 32, 1996.