A different way to review the Chicago Fed National Activity Index

by Scott Brave, senior business economist, and Max Lichtenstein, senior associate economist

This article analyzes the recent sources of strength and weakness in the Chicago Fed National Activity Index (CFNAI), using a new measure that is often a leading indicator of the index’s movements.

The Chicago Fed National Activity Index is a monthly index of U.S. economic activity constructed as a weighted average of 85 economic indicators classified into four groups: production and income; employment, unemployment, and hours; personal consumption and housing; and sales, orders, and inventories. It is designed as a coincident indicator of national economic activity.

In this Chicago Fed Letter, we describe a diffusion index constructed from the weights given to each of the underlying indicators of the CFNAI. We find that this diffusion index is often a leading indicator of the CFNAI’s movements. Thus we use this index to help explain the recent sources of strength and weakness in the CFNAI and discuss its likely implications for growth in economic activity in 2012.

CFNAI and economic activity in 2011

The CFNAI is an example of a “Goldilocks” index. Essentially, this means that the information in various data series on national economic activity is combined in such a way to reflect deviations around a trend rate of economic growth. Accordingly, the CFNAI is normalized to have a mean of zero and a standard deviation of one. In the Goldilocks terminology, this means that a zero value of the index is “just right,” suggesting that the economy is proceeding along its long-term historical growth path. A negative value of the index is “cold,” in that it suggests growth is below average, while a positive value is “hot,” in that it suggests growth is above average.

The CFNAI can be very volatile, since many of the series that make up the index vary significantly from month to month. For this reason, we focus on the three-month moving average of the index, i.e., the CFNAI-MA3 (the blue line in figure 1), which smooths the month-to-month variations over time in order to provide a more consistent picture of variations in economic growth around its long-term trend. This smoothed version of the index has an excellent track record in identifying business cycle turning points as well as the buildup of inflationary pressures from growth in economic activity significantly above its trend rate.

The modest recovery from the deep recession that lasted from December 2007 through June 2009 continued in 2011, according to the CFNAI. However, as figure 1 demonstrates, the recovery was
not without considerable volatility. The CFNAI-MA3 began last year indicating economic growth slightly above its long-run trend, and maintained this position throughout the first quarter of 2011. The second quarter saw steep declines in the index as it plummeted to its lowest level since late 2009, although it remained above the threshold (–0.7) historically indicating the economy has entered a recession. The CFNAI-MA3 then gradually improved during the third and fourth quarters, ending 2011 just above its long-run trend.

The production and income category drove much of the movement in the CFNAI over the course of 2011 (see figure 2). This category’s contribution was strongly positive during the first quarter, but dropped steeply in April and was largely neutral over the second quarter. It then rebounded during the summer months and by year’s end had returned to its March 2011 level. These movements largely reflected the dynamics of manufacturing industrial production and capacity utilization—which suffered early in the year from the supply chain disruptions associated with Japan’s natural disasters in March, but had rebounded by year’s end.

The production, unemployment, and hours category also contributed to the volatility in the CFNAI over the course of 2011. During the first quarter’s strong showing, the support came largely from above-average gains in payroll employment. But after April, job gains slowed considerably and initial claims for unemployment insurance (UI) rose as well. The result was a drop in this category’s contribution to the CFNAI to just below zero by the end of the second quarter. By the end of the third quarter, however, job gains had begun to climb steadily; such gains combined with a declining unemployment rate and decreasing initial UI claims had raised this category’s contribution above zero through the end of the year.

The contribution of the sales, orders, and inventories category to the CFNAI throughout 2011 largely mirrored that of the production and income category. In contrast, the final category, personal consumption and housing, continued to make strong negative contributions to the CFNAI for the fourth consecutive year. This category did, however, experience a slight upward trend from May 2011 through the end of last year based on improving housing starts and permits numbers that, with the exception of August, were above 600,000 annualized units per month.

Looking ahead through 2012

The movements of the CFNAI in early 2012 suggest that growth in economic activity continues to edge further above its long-run trend. Given the unevenness of the recovery to date, it is worthwhile to reexamine the current sources of strength and weakness in the CFNAI and compare them with the developments of the past two years. To summarize this information, we have developed a new metric based on the magnitude of the weight given to each of the underlying indicators in the CFNAI. The construction of this “CFNAI Diffusion Index” is detailed in the accompanying note, and the new measure is also plotted in figure 1.

We track the general trend in improvement and deterioration in the underlying indicators of the CFNAI by tracing the movements of the CFNAI Diffusion Index between −1 and +1. If all of the underlying indicators in a given month are below their long-run averages, this index will equal −1; and if all of the indicators are above their long-run averages, it will equal +1. This is useful in that we can observe the momentum of the CFNAI as its underlying indicators shift above and below their long-run averages over time.

The CFNAI Diffusion Index’s usefulness as a leading indicator of the CFNAI’s movements can be seen in figure 1. After dipping into recessionary territory in late 2007, the CFNAI Diffusion Index bottomed out at −0.92 in September 2008—four months before the CFNAI-MA3 reached its lowest point of the most recent recession. After signaling a recovery was under way in mid-2009 (one month ahead of the CFNAI-MA3), the CFNAI Diffusion Index has been
The CFNAI-MA3 and the CFNAI Diffusion Index both rebounded substantially in early 2012 along with the broader trend in economic activity. One potential explanation for the CFNAI-MA3’s swift rebound is the possible aftereffects of the unexpected tightening in financial conditions that occurred over the course of 2010. Consider figure 3, which depicts the Chicago Fed’s National Financial Conditions Index (NFCI) and adjusted NFCI (ANFCI). Measures of financial conditions are constructed similarly to the CFNAI. Positive values of the NFCI denote financial conditions that are tighter than on average, and positive values of the ANFCI denote financial conditions that are tighter than typically suggested by contemporaneous economic conditions, and values below zero indicate the opposite.

3. Financial conditions and CFNAI

Graph showing the NFCI and ANFCI indices from 2007 to 2012.

Notes: Data are through March 23, 2012. This figure displays the recent history of the Chicago Fed’s National Financial Conditions Index (NFCI) and adjusted NFCI (ANFCI). Values of the NFCI above zero indicate financial conditions that are tighter than average, while values below zero indicate financial conditions that are looser than average. A zero value for the ANFCI indicates a typical level for financial conditions given the contemporaneous value of the three-month moving average of the Chicago Fed National Activity Index (CFNAI-MA3) and three-month total inflation as measured by U.S. Bureau of Economic Analysis’s Personal Consumption Expenditures Price Index. ANFCI values above zero then indicate financial conditions that are tighter than would typically be suggested by contemporaneous economic conditions, and values below zero indicate the opposite.

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Capacity utilization is calculated as the actual output produced with installed equipment divided by the potential output that could be produced with it if used to its full capacity.

The CFNAI Diffusion Index is calculated in the following way:

$$\text{CFNAI}_{\text{diff}} = \frac{\sum |w_i| - \sum |w_i^+|}{\sum |w|}.$$ 

In other words, it is the sum of the absolute values of the weights for the underlying indicators whose contribution to the CFNAI is positive in a given month less the sum of the absolute values of the weights for those indicators whose contribution is negative or neutral in a given month, expressed as a proportion of the total sum of the absolute values of the weights. By construction, the sum of the absolute values of the CFNAI weights is one, so that the numerator in the expression is necessarily the CFNAI Diffusion Index. To make this measure comparable to the CFNAI-MA3, we take its three-month moving average as shown in figure 1. This measure is slightly different than the typical diffusion index, which generally uses the number of positive versus negative and neutral indicators instead to get a sense of the dominant direction of a composite index. We also tried constructing this more standard diffusion index with the CFNAI indicators, but found it to be an inferior leading indicator of the CFNAI.

This threshold was calculated using the techniques described in Travis J. Berge and Óscar Jordà, 2011, “Evaluating the classification of economic activity into recessions and expansions,” *American Economic Journal: Macroeconomics*, Vol. 3, No. 2, April, pp. 246–277. The CFNAI Diffusion Index signals the beginnings and ends of recessions on average one month earlier than the CFNAI-MA3.

For more information on the NFCI and ANFCI, go to www.chicagofed.org/nfci.