Chicago Fed Letter

A snapshot of the Midwest economy: Past and present

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For over ten years, the Chicago Fed has published an index of national economic activity, the Chicago Fed National Activity Index. Here, the authors build on the methodology underlying this index to construct a Midwest counterpart that captures variation in economic activity in the five states that make up the Seventh Federal Reserve District.

In this *Chicago Fed Letter*, we extend the methodology underlying the Chicago Fed National Activity Index (CFNAI), applying it on a regional basis in order to describe growth in economic activity in the five midwestern states that make up the Seventh Federal Reserve District.[1]
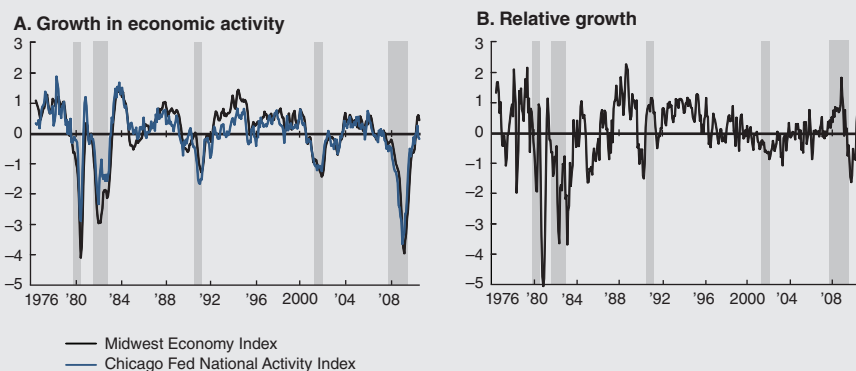

1. Midwest and national activity indexes

A. Growth in economic activity

B. Relative growth

— Midwest Economy Index
— Chicago Fed National Activity Index

NOTES: All indexes have been standardized to have a zero mean and are expressed in standard deviation units. Shading indicates official periods of recession as identified by the National Bureau of Economic Research. The Midwest Economy Index encompasses the five states of the Seventh Federal Reserve District (Illinois, Wisconsin, Michigan, Indiana, and Iowa), and measures growth in nonfarm business activity. Relative growth is the Midwest Economy Index measured relative to the three-month moving average of the Chicago Fed National Activity Index.

Previous research has concluded that Seventh District business cycles are very similar to their national counterparts.[2] However, we find that subtle differences do exist between midwestern and national growth in economic activity. We describe how these differences have changed over time and what they imply for the current state of the Midwest economy.

Constructing the MEI

Like the CFNAI, our Midwest Economy Index (MEI) is a weighted average of measures of growth in economic activity. While the CFNAI is constructed from national indicators, the MEI is instead based upon comparable indicators for the Midwest and the Seventh District states. Each index weights its indicators by the relative degree to which they explain the overall variation among them.

The way in which they do so, however, varies according to the different data types. For instance, many of the state and Midwest indicators we employ differ in originating date as well as reporting frequency. This produces an "unbalanced" data set, with monthly and quarterly observations beginning at different times. Here, we follow the strategy outlined by Stock and Watson[3] to produce a monthly index that can accommodate this feature of the data.[4]

To begin, we translate all 128 data series into a common frequency by taking a three-month moving average of the monthly variables.[5] Each is then given a stationary transformation and standardized to have a zero mean and unit variance. In this sense, the MEI most closely corresponds to the three-month moving average of the CFNAI (the CFNAI-MA3). In this article, when we draw comparisons between the MEI and CFNAI, these
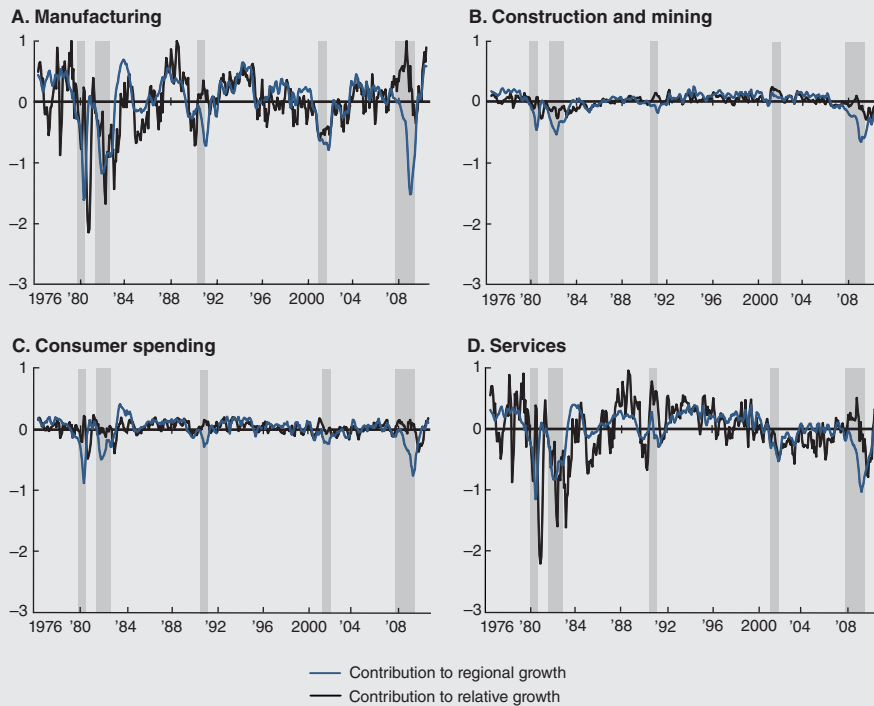
2. Sectoral components of the Midwest Economy Index

A. Manufacturing

B. Construction and mining

C. Consumer spending

D. Services

Contribution to regional growth
Contribution to relative growth

NOTES: The sectoral components sum to the Midwest Economy Index in each time period. Manufacturing and construction and mining summarize production and employment indicators. Services contains only employment indicators, while consumer spending summarizes employment, unemployment, personal income, and home and retail sales indicators. Shading indicates official periods of recession as identified by the National Bureau of Economic Research. Relative growth is the Midwest Economy Index measured relative to the three-month moving average of the Chicago Fed National Activity Index.

comparisons will actually be between the MEI and the CFNAI-MA3.

Interpreting the MEI

Our motivation in creating the MEI is to better understand the relationship between growth in national economic activity and growth in Midwest economic activity. The MEI is a measure of regional economic activity in much the same way as the CFNAI is for national economic activity. CFNAI values above zero indicate growth in national economic activity above its historical trend, and values below zero indicate growth below trend. Similarly, MEI values correspond to deviations in growth in Midwest economic activity around its historical trend.

We compare the MEI with the CFNAI, as seen in panel A of figure 1. To make the indexes directly comparable, both are shown in standard deviation units. Over the 34-year period we consider, growth in Midwest economic activity around its trend has tended to coincide to a large degree with its national counterpart.

However, over shorter periods of time this has not always been the case, particularly around the beginnings and ends of recessions as defined by the National Bureau of Economic Research (NBER).[6]

To highlight these periods, we reconstructed the MEI using the standardized residuals from linear regressions of each of its underlying indicators on the current and lagged value of the CFNAI adjusted for the frequency of each indicator.[7] The resulting index in panel B of figure 1 is measured such that a positive value indicates, on average, stronger growth in regional versus national economic activity, while a negative value indicates the opposite. We refer to this index as measuring the "relative" growth of the Midwest.

The Midwest business cycle was particularly pronounced during the later months of the recent recession and those of the late 1970s and early 1980s. The same is true for the recoveries that followed. Other significant periods are the recent recession's early months, which were milder regionally; the 2001 recession,

which somewhat more adversely affected the Midwest region; and the 1990–91 recession, which was milder but was preceded by an extended period of weakness in the Midwest region.
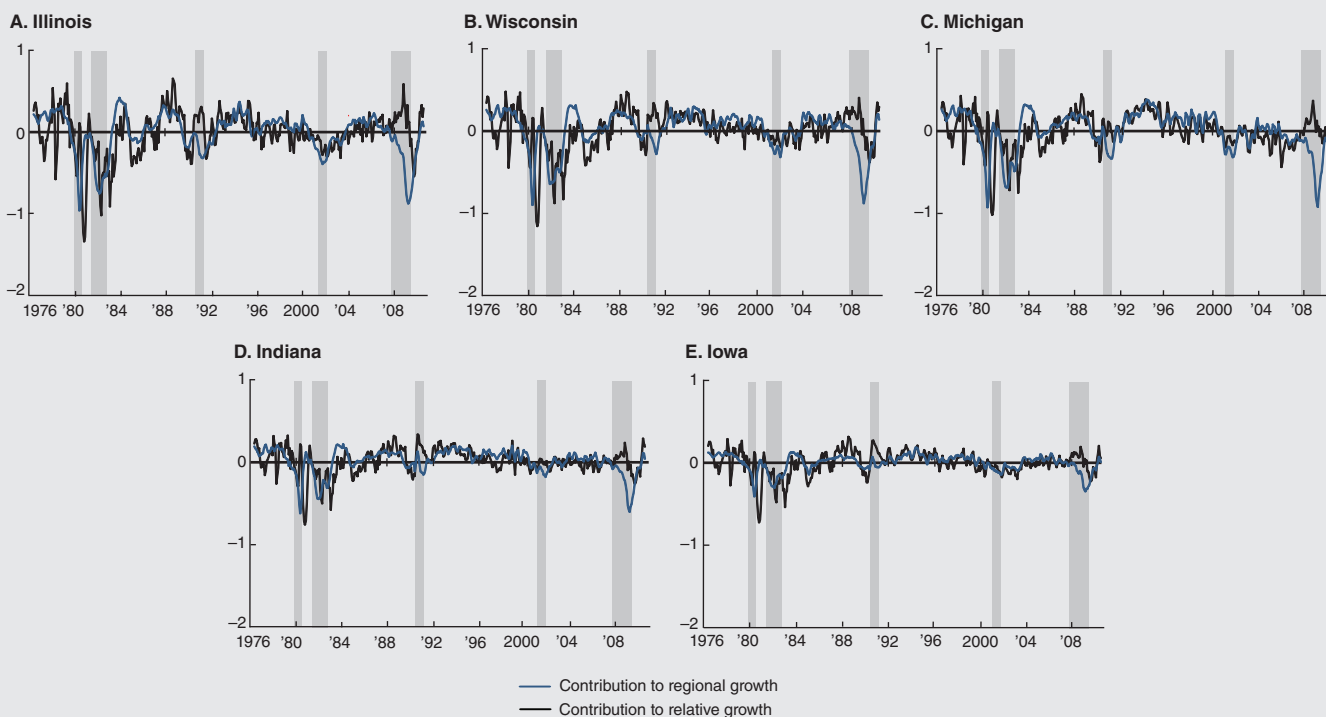
Sectoral and geographic components

Splitting the MEI into sectoral components, as seen in figure 2, can explain much of what we see in the previous figure. The four sectoral components we consider are manufacturing, construction and mining, consumer spending, and services. The different types of state and Midwest indicators that make up each component are listed in the notes of figure 2.

Manufacturing (panel A of figure 2) constitutes the largest sectoral component, followed closely by services (panel D of figure 2). Together they account for nearly two-thirds of the variation in state and Midwest indicators captured by the MEI. They are also highly positively correlated. In this respect, much of what we see in panel A of figure 1 can be summed up by the following: When manufacturing has thrived, so has the region.

It is also manufacturing and services that exhibit regional growth patterns that most significantly deviate from the national business cycle. Overall, the contribution of services to relative growth is slightly larger, reflecting the growing importance of the service sector as the Midwest economy has expanded. As such, it remains highly positively correlated with manufacturing. A good example of this is the period from the mid-1980s through the 1990s, where above-average relative growth was due in large part to services but was reinforced by manufacturing on several occasions.

There are some notable exceptions, however, including the behavior of the construction and mining and consumer spending components (panels B and C of figure 2) during the recent recession. Both made contributions to the relative growth of the region that were positive before the fall of 2008. Since then, the construction and mining component has been a negative contributor to relative growth. The consumer spending component also turned negative but recently

3. State subindexes of the Midwest Economy Index

A. Illinois

B. Wisconsin

C. Michigan

D. Indiana

E. Iowa

— Contribution to regional growth
— Contribution to relative growth

NOTES: The state subindexes do not sum to the Midwest Economy Index in each time period because a small number of indicators exist only at the regional level. Shading indicates official periods of recession as identified by the National Bureau of Economic Research. Relative growth is the Midwest Economy Index measured relative to the three-month moving average of the Chicago Fed National Activity Index.

rose above its contribution level before the fall of 2008.

Much of this can be explained by the housing and labor market indicators in these two sectoral components. The deterioration in housing market conditions that began in 2006 affected growth in national economic activity to a larger degree than it did growth in Midwest economic activity before the fall of 2008. Furthermore, job loss played a much smaller role in declining growth in Midwest activity early in the recession, while employment gains during the recovery have subsequently formed a larger part of Midwest growth attributable to consumer spending.

Using only the indicators for the respective states in the Seventh District, we also constructed state subindexes seen in figure 3.[8] No state dominates growth in Midwest economic activity in the sense that the states' contributions to the variance explained by the MEI are fairly evenly distributed. Contributions from Indiana and Iowa (panels D and E) do, however, explain less variation than those

from Illinois, Wisconsin, and Michigan (panels A, B, and C). Growth trends across states are very similar, with the exception of the weakness of the Michigan economy over the past decade.

During the recent recovery, all five Seventh District states have made positive contributions to the MEI. Even when put in "relative" terms, this remains the case, suggesting that the manufacturing-driven recovery has benefited the region disproportionately. In this sense, the Seventh District has been a leading indicator of the recovery. As of July 2010, growth in Midwest economic activity remained strong, but had started to slow in every state except Michigan.

Conclusion

Seventh District business cycles tend to resemble national business cycles to a high degree, although there have been several periods over the past 34 years when the two have deviated significantly from each other. The growth of the service industry over time and the predominance of the manufacturing sector in the Seventh District explain the majority of these

deviations. Some variation exists among the Seventh District states; but on the whole, growth in economic activity in each is consistent with that of the nation.

1 The CFNAI methodology is described in detail at www.chicagofed.org/digital_assets/ publications/cfnai/background/cfnai_ background.pdf. The Seventh District comprises all of Iowa, but only the greater parts of Illinois, Indiana, Michigan, and Wisconsin. Because of data availability, the construction of our Midwest Economy Index entails the entire boundaries of all five states.

2 Michael A. Kouparitsas and Daisuke J. Nakajima, 2006, "Are U.S. and Seventh District business cycles alike?," *Economic Perspectives*, Federal Reserve Bank of Chicago, Vol. 30, No. 3, Third Quarter, pp. 45–60.

3 J. H. Stock and M. W. Watson, 2002, "Forecasting using principal components from a large number of predictors," *Journal of the American Statistical Association*, Vol. 97, No. 460, pp. 1167–1179.

4 The Stock and Watson (2002) method requires that we specify a number of common factors explaining all 128 data series. In what follows, we determined the number of common factors to be one.

5 The complete list of data series is available upon request from the authors.

6 The NBER's Business Cycle Dating Committee maintains a chronology of the beginnings and ends of recessions that can be found at www.nber.org/cycles/ cyclesmain.html.

7 The dominance of employment indicators in the MEI versus the CFNAI leads to a slight lag in their dynamic relationship; hence, the lagged term in the regressions. Omitting this term does not appreciably change the results because not every variable was regressed on the lagged value of the CFNAI. Instead, we used a measure of model fit called the Bayesian information criterion to determine which variables should be regressed on the lagged value of the CFNAI.

8 Similar metrics are produced by Philadelphia Fed staff, who use an alternative methodology; see Theodore M. Crone and Alan Clayton-Matthews, 2005, "Consistent economic indexes for the 50 states," *Review of Economics and Statistics*, Vol. 87, No. 4, pp. 593–603.