

Metal Industry Indicators

Indicators of Domestic Primary Metals, Steel, Aluminum, and Copper Activity

October 2018

In September, the primary metals leading index was unchanged from August, its 6-month smoothed growth rate decreased (table 2). The primary metals leading index 6-month smoothed growth rate fell below the +1.0% growth rate threshold in July, August, and September. The U.S. nonferrous metal products inventories growth rates had been negative from September 2017 through May 2018, before turning positive in June, July, and August (table 1); inventory increases suggest decreased consumption of nonferrous metal products. In March 2018, the primary aluminum 6-month smoothed growth rate turned negative, ending an 18-month period of positive double digit growth; positive growth resumed in April through June before turning negative again in July, August, and September (table 1). Also in March 2018, the primary copper 6-month smoothed growth rate ended a 16-month period of positive double digit growth; the decline continued through May and turned negative in June, July, August, and September (table 1). The steel scrap 6-month smoothed growth rate had double digit positive growth rates from November 2016 through September 2017, paused in October and November 2017, and resumed double digit growth rates in December 2017 through July 2018, August recorded single digit positive growth, September turned to single digit negative growth (table 1).

The **primary metals leading index** was 169.1 in September, unchanged from a downwardly revised 169.1 in August, and its 6-month smoothed growth rate decreased to 0.6% in September from a downwardly revised 0.9% in August (table 2). The 6-month smoothed growth rate is a compound annual rate, which measures near-term trend. Usually, a growth rate above +1.0% signals an increase in metals activity, and a growth rate below -1.0% indicates a downturn in activity. The primary metals leading index growth rate posted growth rates above +1.0% from April 2016 through June 2018, July, August, and September growth rates decreased below the +1.0% threshold, nevertheless these growth rates remain in positive territory. Of the five indicators that were available to calculate the September leading index, the machinery, construction, farm, and industrial S&P stock price index [0.6] was the only positive contribution (table 3). The largest negative contributions were the primary metals average weekly hours [-0.2] and the Purchasing Managers' Index [-0.2] (table 3). The September leading index

should be considered preliminary because only five of its eight indicators were available, and the leading index will be subject to revision when the other components are added next month.

The **steel leading index** increased to 117.3 in August from 117.0 in July, and its 6-month smoothed growth rate increased to 0.2% in August from an upwardly revised -0.2% in July (table 4). The two largest positive contributions to the steel leading index in August were the Purchasing Managers' Index [0.3] and the growth rate of the U.S. M2 money supply [0.2] (table 5). The two largest negative contributions were the growth rate of the price of steel scrap (#1 heavy melting, \$/ton) [-0.2] and the index of new private housing units authorized by permit [-0.2] (table 5).

The **copper leading index** increased to 130.4 in August from an upwardly revised 130.1 in July, and its 6-month smoothed growth rate increased to 0.7% in August from an upwardly revised 0.4% in

July (table 6). In 2018, except for July and August, the copper leading index growth rate has been above the +1.0% threshold, which could indicate near term strength in copper industry activity (table 6). The two largest positive contributions to the copper leading index in August were new orders of nonferrous metal products [0.3] and the S&P stock price index of building products companies [0.3] (table 7). The largest negative contributions were the index of new private housing units authorized by permit [-0.3] and the LME spot price of primary copper [-0.1] (table 7).

The **leading index of metal prices** was 103.9 in August, unchanged from a downwardly revised 103.9 in July, and its 6-month smoothed growth rate decreased to -6.0% in August from a downwardly revised -6.5% in July (table 1). The leading index of metal prices growth rates were above the +1.0% growth rate threshold in January and February 2018, however, they dipped to 0.0% in March, and fell below the -1.0% threshold level in April, May, June, July, and August 2018, which could signal near term weakness in metal prices (table 1).

Table 1.
Leading Index of Metal Prices and Growth Rates of the Nonferrous Metals Price Index, Inventories of Nonferrous Metal Products, and Selected Metal Prices

| Scrap | Six-Month Smoothed Growth Rates | | | | | | |
|-------------|---------------------------------|-------------------------------|----------------------------|--|------------------------------|----------------------|--------------|
| | Leading Index of Metal Prices | Leading Index of Metal Prices | MII Nonferrous Price Index | U.S. Nonferrous Metal Products Metals (1982\$) | Primary Aluminum Inventories | Primary Steel Copper | Steel Copper |
| | (1967=100) | Growth Rates | Price Index | | | | |
| 2017 | | | | | | | |
| September | 108.9 | 3.1r | 26.4 | -5.9 | 27.0 | 25.0 | 32.2 |
| October | 108.3 | 1.7 | 28.1 | -5.5 | 25.5 | 30.7 | 1.8 |
| November | 108.3 | 1.4r | 20.4 | -4.0 | 10.4 | 22.8 | -3.0 |
| December | 108.2r | 1.0r | 29.1 | -3.5 | 29.0 | 33.0 | 16.5 |
| 2018 | | | | | | | |
| January | 108.4r | 1.1r | 27.1 | -6.4 | 22.1 | 25.8 | 37.2 |
| February | 108.6 | 1.3 | 18.1 | -4.7 | 12.0 | 17.5 | 32.0 |
| March | 108.0 | 0.0 | 6.2 | -2.1 | -4.9 | 6.6 | 42.2 |
| April | 107.2 | -1.6r | 5.7 | -0.9 | 15.5 | 7.4 | 49.8 |
| May | 105.8 | -3.9 | 5.4 | -0.4r | 18.9 | 5.9 | 32.8 |
| June | 104.5 | -5.9 | -2.9 | 0.9 | 5.4 | -1.8 | 23.0 |
| July | 103.9r | -6.5r | -18.0 | 7.4r | -6.9 | -15.7 | 24.1 |
| August | 103.9 | -6.0 | -20.7 | 13.6 | -2.9 | -19.4 | 6.9 |
| September | NA | NA | -17.8 | NA | -11.3 | -13.9 | -7.8 |

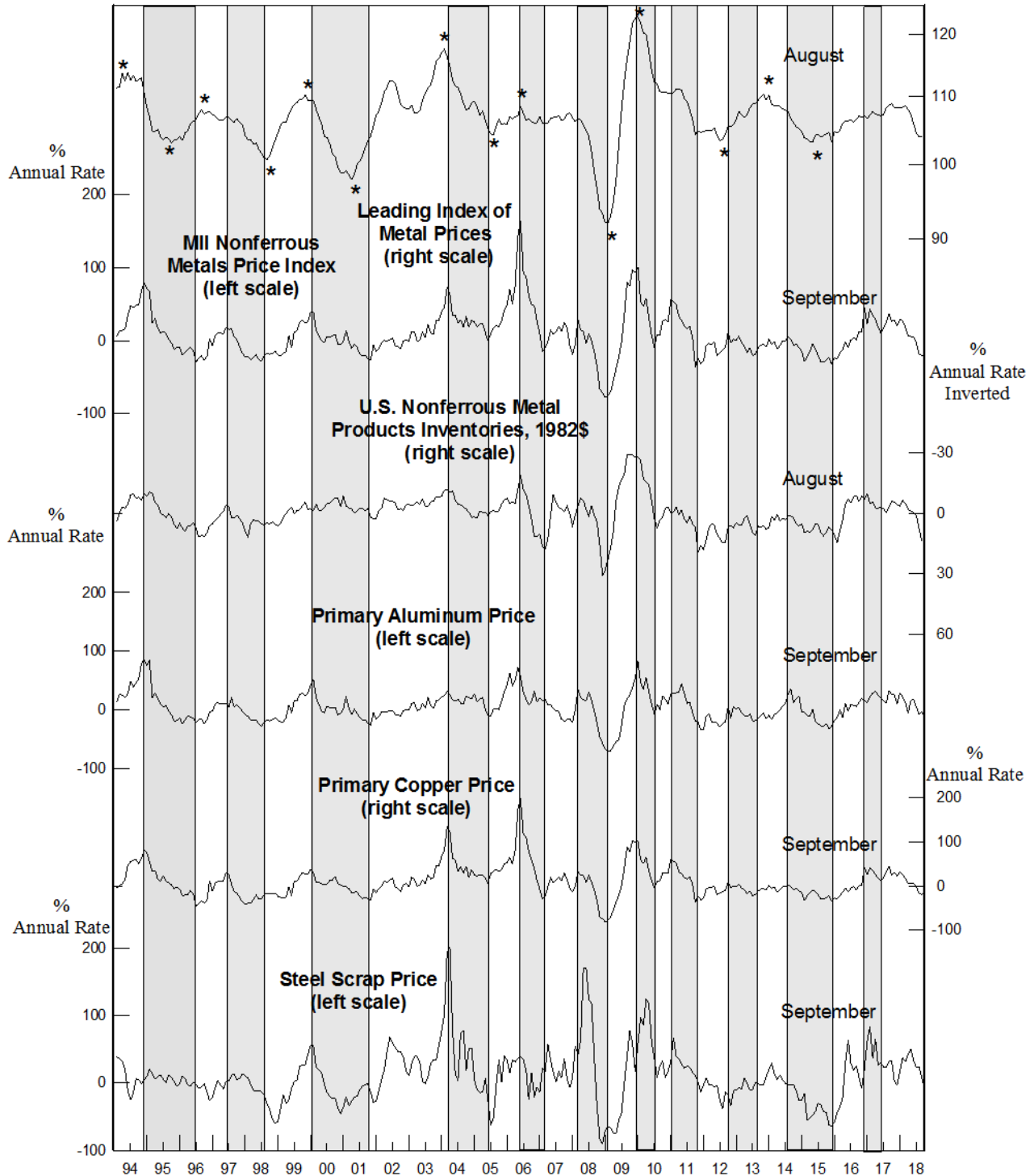
NA: Not available r: Revised

Sources: U.S. Geological Survey (USGS), American Metal Market (AMM), the London Metal Exchange (LME), U.S. Census Bureau, the Organisation for Economic Cooperation and Development (OECD), and Federal Reserve Board.

Note: The components of the Leading Index of Metal Prices are the spread between the U.S. 10-year Treasury Note and the federal funds rate, and the 6-month smoothed growth rates of the deflated value of new orders for nonferrous metal products, the Organisation for Economic Cooperation and Development (OECD) Total Leading Index, and the reciprocal of the trade-weighted average exchange value of the U.S. dollar against other major currencies. The Metal Industry Indicators (MII) Nonferrous Metals Price Index measures changes in end-of-the-month prices for primary aluminum, copper, lead, and zinc traded on the London Metal Exchange (LME). The steel scrap price used is the price of No. 1 heavy melting. Inventories consist of the deflated value of finished goods, work in progress, and raw materials for U.S.-produced nonferrous metal products (NAICS 3313, 3314, & 335929). Six-month smoothed growth rates are based on the ratio of the current month's index or price to its average over the preceding 12 months, expressed at a compound annual rate.

CHART 1.
LEADING INDEX OF METAL PRICES AND GROWTH RATES
OF NONFERROUS METALS PRICE INDEX, INVENTORIES OF
NONFERROUS METAL PRODUCTS, AND SELECTED PRICES

1967 = 100



Shaded areas are downturns in the nonferrous metals price index growth rate. Asterisks (*) are peaks and troughs in the economic activity reflected by the leading index of metal prices. Scale for nonferrous metal products inventories is inverted.

Table 2.
Primary Metals Industry Indexes and Growth Rates

| | Leading Index | | Coincident Index | |
|-------------|---------------|-------------|------------------|-------------|
| | (1977 = 100) | Growth Rate | (1977 = 100) | Growth Rate |
| 2017 | | | | |
| September | 166.4 | 4.6 | 109.0 | 3.7 |
| October | 167.2 | 4.7 | 109.4 | 3.7 |
| November | 167.3 | 4.0 | 110.4 | 5.0 |
| December | 167.5 | 3.7 | 111.1 | 5.6 |
| 2018 | | | | |
| January | 169.7 | 5.6 | 111.5 | 5.8 |
| February | 169.3 | 4.6 | 112.2 | 6.3 |
| March | 170.2 | 5.1 | 112.7 | 6.4 |
| April | 169.5 | 3.5 | 113.2 | 6.4r |
| May | 168.9r | 2.3r | 111.9r | 3.3r |
| June | 169.7 | 2.6 | 112.4 | 3.4 |
| July | 168.0r | 0.1r | 112.2r | 2.3r |
| August | 169.1r | 0.9r | 112.5 | 2.2 |
| September | 169.1 | 0.6 | NA | NA |

NA: Not available **r:** Revised

Note: Growth rates are expressed as compound annual rates based on the ratio of the current month's index to the average index during the preceding 12 months.

Table 3.
Contribution of Each Primary Metals Index Component to the Percent Change in the Index from the Previous Month

| | | | | |
|--|--|--|---------------|------------------|
| Leading Index | | | August | September |
| 1. Average weekly hours, primary metals (NAICS 331) | | | -0.2r | -0.2 |
| 2. Weighted S&P stock price index, machinery, construction and farm and industrial (December 30, 1994=100) | | | 0.2r | 0.6 |
| 3. Ratio of price to unit labor cost (NAICS 331) | | | 0.4r | 0.0 |
| 4. USGS metals price index growth rate | | | -0.2r | -0.1 |
| 5. New orders, primary metal products, (NAICS 331 & 335929) 1982\$ | | | 0.0 | NA |
| 6. Index of new private housing units authorized by permit | | | -0.2 | NA |
| 7. Growth rate of U.S. M2 money supply, 2009\$ | | | 0.2 | NA |
| 8. PMI | | | 0.4r | -0.2 |
| Trend adjustment | | | 0.0 | 0.0 |
| | | | 0.6r | 0.0 |
| Coincident Index | | | July | August |
| 1. Industrial production index, primary metals (NAICS 331) | | | -0.1r | 0.4 |
| 2. Total employee hours, primary metals (NAICS 331) | | | -0.3r | -0.1 |
| 3. Value of shipments, primary metals products, (NAICS 331 & 335929) 1982\$ | | | 0.1r | 0.0 |
| Trend adjustment | | | 0.1 | 0.0 |
| | | | -0.2r | 0.3 |

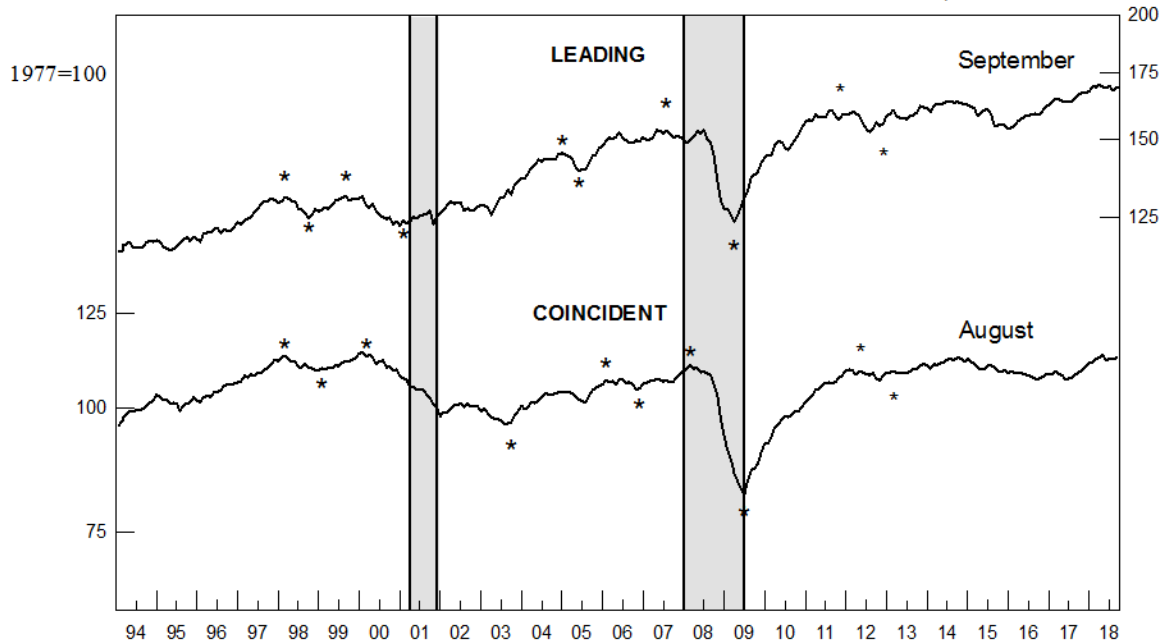
Sources: Leading: 1, Bureau of Labor Statistics; 2, Standard & Poor's and U.S. Geological Survey; 3, U.S. Geological Survey; 4, Journal of Commerce and U.S. Geological Survey; 5, U.S. Census Bureau and U.S. Geological Survey; 6, U.S. Census Bureau and U.S. Geological Survey; 7, Federal Reserve Board, The Conference Board, and U.S. Geological Survey; and 8, Institute for Supply Management. Coincident: 1, Federal Reserve Board; 2, Bureau of Labor Statistics and U.S. Geological Survey; and 3, U.S. Census Bureau and U.S. Geological Survey. All series are seasonally adjusted, except 2, 3, and 4 of the leading index.

NA: Not available **r:** Revised

Note: A component's contribution, shown in Tables 3, 5, 7, and 9, measures its effect, in percentage points, on the percent change in the index. Each month, the sum of the contributions plus the trend adjustment equals (except for rounding differences) the index's percent change from the previous month.

CHART 2.

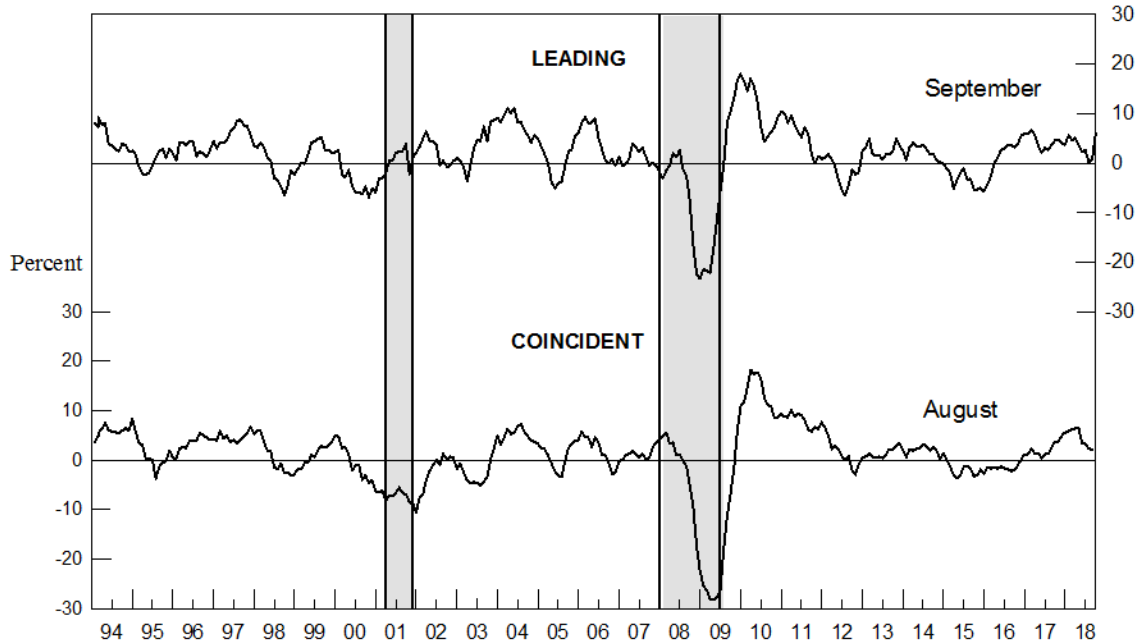
PRIMARY METALS: LEADING AND COINCIDENT INDEXES, 1994-2018 1977=100



Shaded areas are business cycle recessions. Asterisks (*) signify peaks (the end of an expansion) and troughs (the end of a downturn) in the economic activity reflected by the indexes.

CHART 3.

PRIMARY METALS: LEADING AND COINCIDENT GROWTH RATES, 1994-2018 Percent



Shaded areas are business cycle recessions.

The growth rates are expressed as compound annual rates based on the ratio of the current month's index to its average level during the preceding 12 months.

**Table 4.
Steel Industry Indexes and Growth Rates**

| | Leading Index | | Coincident Index | |
|-------------|---------------|-------------|------------------|-------------|
| | (1977 = 100) | Growth Rate | (1977 = 100) | Growth Rate |
| 2017 | | | | |
| September | 116.9 | 1.3 | 117.8 | 4.9 |
| October | 117.1 | 1.1 | 119.1 | 6.2 |
| November | 116.1 | -0.9 | 120.0 | 6.6 |
| December | 117.1 | 0.6 | 120.1 | 6.0 |
| 2018 | | | | |
| January | 117.0 | 0.6 | 119.3 | 3.9 |
| February | 117.3 | 1.0 | 120.7 | 5.5 |
| March | 117.8 | 1.7 | 121.4 | 5.8 |
| April | 117.6 | 1.2 | 121.7 | 5.4r |
| May | 117.0 | 0.2 | 121.4r | 3.9r |
| June | 118.3 | 2.0r | 121.9 | 4.0 |
| July | 117.0 | -0.2r | 121.3r | 2.2r |
| August | 117.3 | 0.2 | 122.3 | 3.1 |

r: Revised

Note: Growth rates are expressed as compound annual rates based on the ratio of the current month's index to the average index during the preceding 12 months.

**Table 5.
Contribution of Each Steel Index Component to the Percent Change
in the Index from the Previous Month**

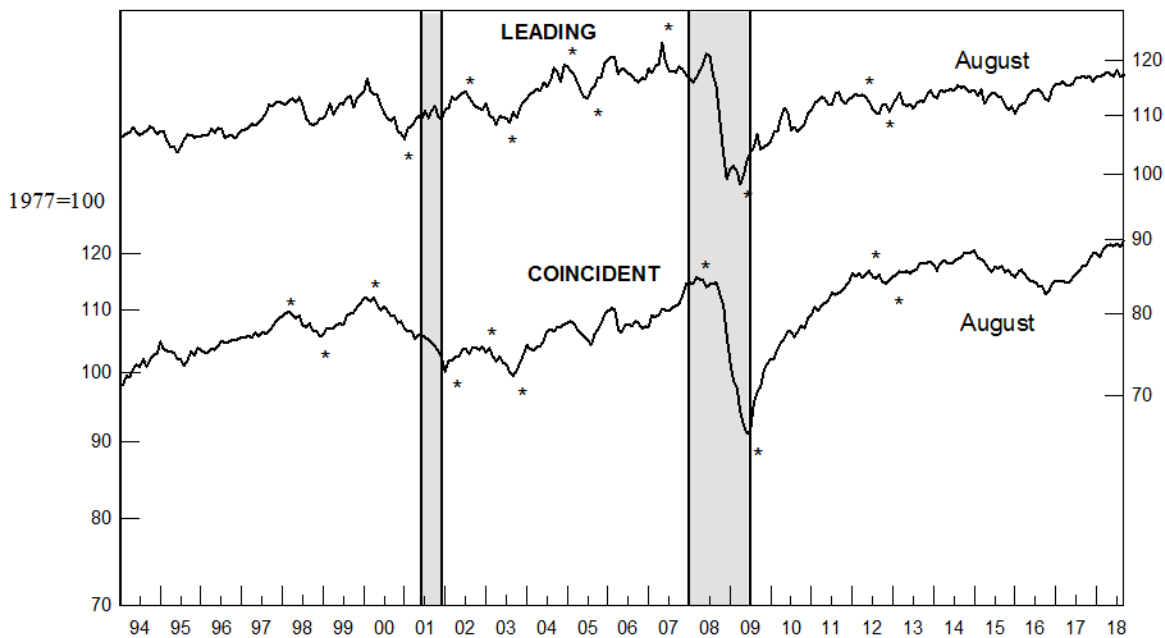
| Leading Index | July | August |
|---|-------|--------|
| 1. Average weekly hours, iron and steel mills (NAICS 3311 & 3312) | -0.8r | 0.1 |
| 2. New orders, iron and steel mills (NAICS 3311 & 3312), 1982\$ | 0.0 | 0.0 |
| 3. Shipments of household appliances, 1982\$ | 0.1 | 0.1 |
| 4. S&P stock price index, steel companies | 0.0 | -0.1 |
| 5. Retail sales of U.S. passenger cars and light trucks (units) | -0.1 | 0.0 |
| 6. Growth rate of the price of steel scrap (#1 heavy melting, \$/ton) | -0.1 | -0.2 |
| 7. Index of new private housing units authorized by permit | 0.0 | -0.2 |
| 8. Growth rate of U.S. M2 money supply, 2009\$ | 0.0 | 0.2 |
| 9. PMI | -0.2 | 0.3 |
| Trend adjustment | 0.0 | 0.0 |
| Percent change (except for rounding differences) | -1.1 | 0.2 |
| Coincident Index | | |
| 1. Industrial production index, iron and steel products (NAICS 3311 & 3312) | 0.1 | 0.3 |
| 2. Value of shipments, iron and steel mills (NAICS 3311 & 3312), 1982\$ | 0.1 | 0.1 |
| 3. Total employee hours, iron and steel mills (NAICS 3311 & 3312) | -0.9r | 0.3 |
| Trend adjustment | 0.1 | 0.1 |
| Percent change (except for rounding differences) | -0.6r | 0.8 |

Sources: Leading: 1, Bureau of Labor Statistics; 2, U.S. Census Bureau and U.S. Geological Survey; 3, U.S. Census Bureau and U.S. Geological Survey; 4, Standard & Poor's; 5, U.S. Bureau of Economic Analysis and American Automobile Manufacturers Association; 6, Journal of Commerce and U.S. Geological Survey; 7, U.S. Census Bureau and U.S. Geological Survey; 8, Federal Reserve Board, The Conference Board, and U.S. Geological Survey; and 9, Institute for Supply Management. Coincident: 1, Federal Reserve Board; 2, U.S. Census Bureau and U.S. Geological Survey; and 3, Bureau of Labor Statistics and U.S. Geological Survey. All series are seasonally adjusted, except 4 and 6 of the leading index.

r: Revised

CHART 4.
STEEL: LEADING AND COINCIDENT INDEXES, 1994-2018

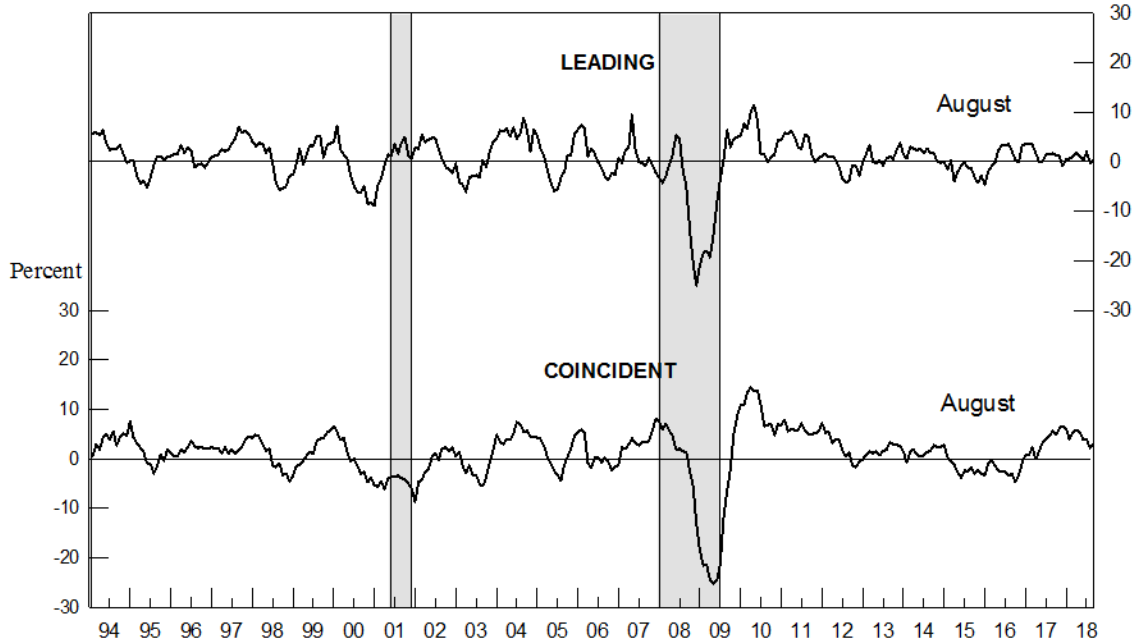
1977=100



Shaded areas are business cycle recessions. Asterisks (*) signify peaks (the end of an expansion) and troughs (the end of a downturn) in the economic activity reflected by the indexes.

CHART 5.
STEEL: LEADING AND COINCIDENT GROWTH RATES, 1994-2018

Percent



Shaded areas are business cycle recessions.

The growth rates are expressed as compound annual rates based on the ratio of the current month's index to its average level during the preceding 12 months.

**Table 6.
Copper Industry Indexes and Growth Rates**

| | Leading Index | | Coincident Index | |
|-------------|----------------------|--------------------|-------------------------|--------------------|
| | (1977 = 100) | Growth Rate | (1977 = 100) | Growth Rate |
| 2017 | | | | |
| September | 128.8 | 2.8r | 104.1 | 5.3 |
| October | 130.4 | 4.7 | 102.6 | 2.2 |
| November | 129.0 | 2.2 | 100.8 | -0.9 |
| December | 127.4 | -0.4 | 100.3 | -2.0 |
| 2018 | | | | |
| January | 131.4 | 5.3 | 105.6 | 7.9 |
| February | 130.5 | 3.3 | 105.0 | 5.9 |
| March | 131.2 | 3.9 | 105.0 | 5.3 |
| April | 131.1 | 3.0 | 105.9 | 6.2 |
| May | 130.7 | 2.1 | 105.2 | 4.2 |
| June | 130.7 | 1.5 | 107.3 | 7.1 |
| July | 130.1r | 0.4r | 105.6r | 3.1r |
| August | 130.4 | 0.7 | 105.2 | 2.0 |

r: Revised

Note: Growth rates are expressed as compound annual rates based on the ratio of the current month's index to the average index during the preceding 12 months.

**Table 7.
Contribution of Each Copper Index Component to the Percent Change
in the Index from the Previous Month**

| Leading Index | July | August |
|--|-------------|---------------|
| 1. Average weekly hours, nonferrous metals (except aluminum) (NAICS 3314) | 0.0r | 0.1 |
| 2. New orders, nonferrous metal products, (NAICS 3313, 3314, & 335929) 1982\$ | 0.0r | 0.3 |
| 3. S&P stock price index, building products companies | 0.0 | 0.3 |
| 4. LME spot price of primary copper | -0.4 | -0.1 |
| 5. Index of new private housing units authorized by permit | 0.1 | -0.3 |
| 6. Spread between the U.S. 10-year Treasury Note and the federal funds rate | -0.1 | 0.0 |
| Trend adjustment | 0.0 | 0.0 |
| Percent change (except for rounding differences) | -0.4r | 0.2 |
| Coincident Index | | |
| 1. Industrial production index, primary smelting and refining of copper (NAICS 331411) | -0.6r | 0.2 |
| 2. Total employee hours, nonferrous metals (except aluminum) (NAICS 3314) | -1.0r | -0.6 |
| 3. Copper refiners' shipments (short tons) | 0.0 | 0.0 |
| Trend adjustment | 0.1 | 0.1 |
| Percent change (except for rounding differences) | -1.6r | -0.4 |

Sources: Leading: 1, Bureau of Labor Statistics; 2, U.S. Census Bureau and U.S. Geological Survey; 3, Standard & Poor's; 4, London Metal Exchange; 5, U.S. Census Bureau and U.S. Geological Survey; and 6, Federal Reserve Board and U.S. Geological Survey. Coincident: 1, Federal Reserve Board; 2, Bureau of Labor Statistics; and 3, American Bureau of Metal Statistics, Inc. and U.S. Geological Survey. All series are seasonally adjusted, except 3, 4, and 6 of the leading index.

r: Revised

CHART 6.
COPPER: LEADING AND COINCIDENT INDEXES, 1994-2018

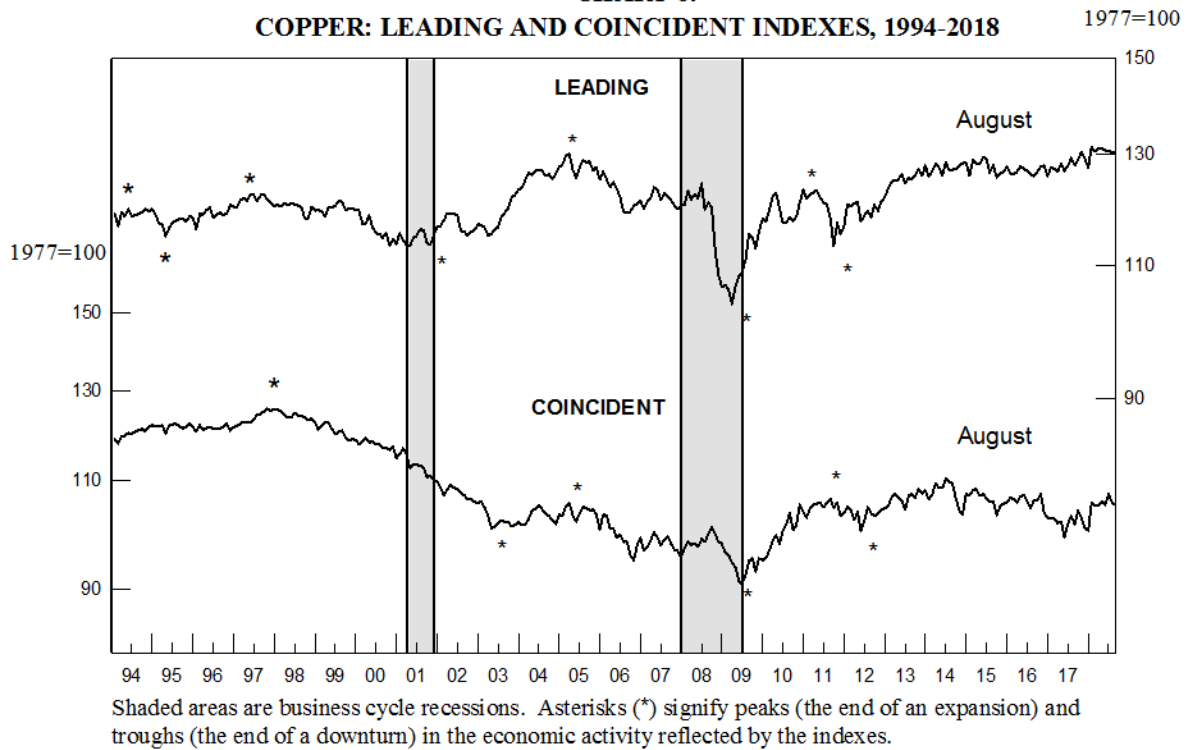
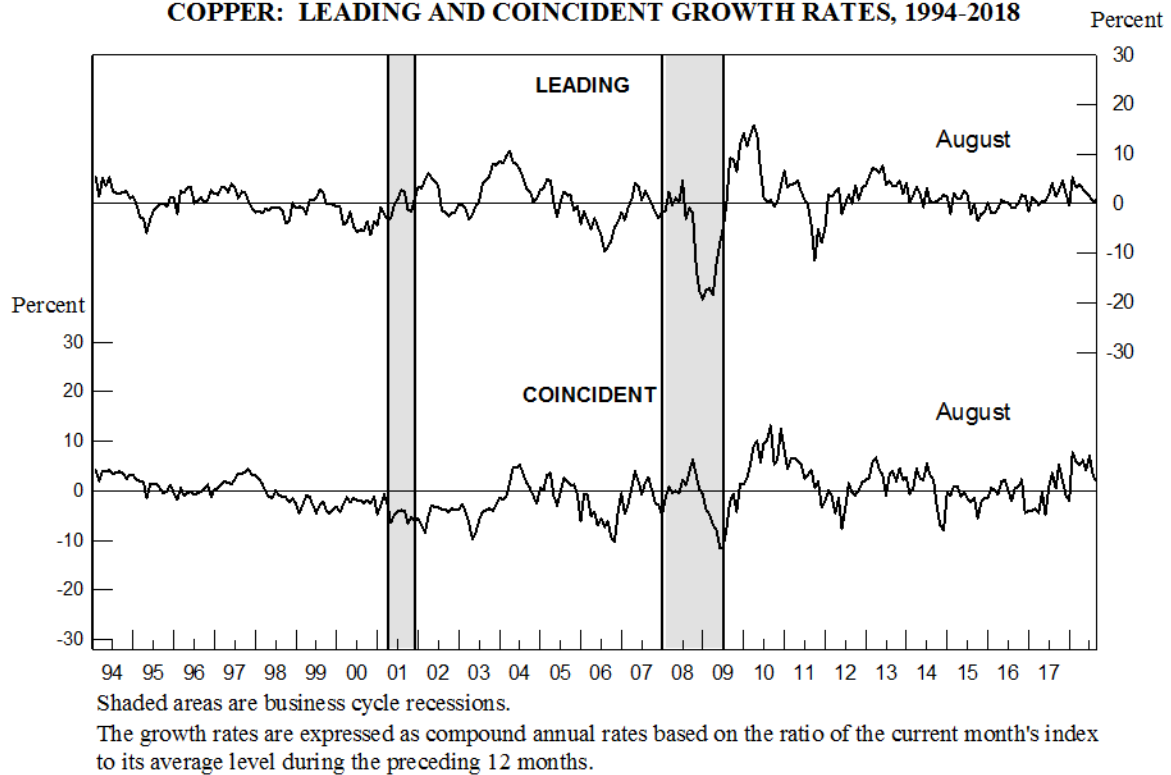


CHART 7.
COPPER: LEADING AND COINCIDENT GROWTH RATES, 1994-2018



Explanation

Each month, the U.S. Geological Survey tracks the effects of the business cycle on three U.S. metal industries by calculating and publishing composite indexes of leading and coincident indicators. Wesley Mitchell and Arthur Burns originated the cyclical-indicators approach for the economy as a whole at the National Bureau of Economic Research in the mid-1930s. Over subsequent decades this approach was developed and refined, mostly at the National Bureau, under the leadership of Geoffrey H. Moore.¹

A business cycle can briefly be described as growth in the level of economic activity followed by a decline succeeded by further growth. These alternating periods of growth and decline do not occur at regular intervals. Composite indexes, however, can help determine when highs and lows in the cycle might occur. A composite index combines cyclical indicators of diverse economic activity into one index, giving decision makers and economists a single measure of how changes in the business cycle are affecting economic activity.

The indicators in the metal industry leading indexes historically give signals several months in advance of major changes in a coincident index, a measure of current metal industry activity. Indicators that make up the leading indexes are, for the most part, measures of anticipations or new commitments to various economic activities that can affect the metal industries in the months ahead.

Composite coincident indexes for the metal industries consist of indicators for production, shipments, and total employee hours worked. As such, the coincident indexes can be regarded as measures of the economic health of the metal industries.

The metal industry coincident indexes reflect industry activity classified by the U.S. Standard Industrial Classification (SIC) and the North American Industry Classification System (NAICS). Of the three metal industries, primary metals (NAICS 331) is the broadest, containing 25 different metal processing industries. Steel and copper are specific industries within the primary metals group.

The SIC was the main vehicle used by the U.S. Government and others in reporting industry economic statistics throughout most of the last century. Starting with the 1997 U.S. Economic Census, the U.S. Government began using the NAICS, which classifies economic data for industries in Canada, Mexico, and the United States. From 1997 onward, the metal industry indexes reflect the NAICS classification, while indexes for earlier years follow the SIC.

The largest change to primary metals because of the NAICS deals with other communication and energy wire manufacturing (NAICS 335929). Under NAICS, this manufacturing was removed from primary metals (NAICS 331) and added to electrical equipment, appliance, and component manufacturing (NAICS 3359). In order to maintain consistency with years before 1997, the USGS estimated values for NAICS 335929 and added them to the appropriate metal industry indicators and indexes for the years after 1997.

In May 2016, the Census Bureau benchmarked the 2008-2011 Annual Survey of Manufactures (ASM) to the revised 2012 Economic Census. While the NAICS has been revised since 1997 and was revised for 2012, the ASM follows the 2007 NAICS. For aluminum and nonferrous metals, the result of this benchmark indicates a slightly lower level of

inventories, but no significant contributions for other communication and energy wire.

Because there is no significant contribution to the monthly changes and trend by including estimates of inventories for other communication and energy wire, the USGS will discontinue estimation and including such inventories starting with the June 2016 issue of the Metal Industry Indicators.

The metal industry leading indexes turn before their respective coincident indexes an average of 8 months for primary metals and 7 months for steel and copper.

The leading index of metal prices, also published in the Metal Industry Indicators, is designed to signal changes in a composite index of prices for primary aluminum, copper, lead, and zinc traded on the London Metal Exchange. On average, this leading index indicates significant changes in price growth about 8 months in advance.

The growth rate used in the Metal Industry Indicators is a 6-month smoothed growth rate at a compound annual rate, calculated from a moving average. Moving averages smooth fluctuations in data over time so that trends can be observed. The 6-month smoothed growth rate is based upon the ratio of the latest monthly value to the preceding 12-month moving average:

$$\left(\left(\frac{\text{current value}}{\text{preceding 12-month moving average}} \right)^{\frac{12}{6.5}} - 1 \right) * 100$$

Because the interval between midpoints of the current month and the preceding 12 months is 6.5 months, the ratio is raised to the 12/6.5 power to derive a compound annual rate.

The growth rates measure the near-term industry trends. They, along with other information about the metal industries and the world economy, are the main tools used to determine the outlook of the industries. A 6-month smoothed growth rate above +1.0% usually means increasing growth; a rate below -1.0% usually means declining growth.

The next update for these indexes is scheduled for release on the World Wide Web at 10:00 a.m. EDT, Friday, November 16. The address for Metal Industry Indicators on the World Wide Web is: <http://minerals.usgs.gov/minerals/pubs/mii/>

The Metal Industry Indicators is produced at the U.S. Geological Survey by the National Minerals Information Center. The report is prepared by Jeffrey Busse (703-648-4914; e-mail: jbusse@usgs.gov). Data provided by Jacob Fuhr and Annie Hwang. The former Center for International Business Cycle Research, under the direction of Dr. Geoffrey H. Moore, and the former U.S. Bureau of Mines developed the metal industry leading and coincident indexes in the early 1990s. Customers can send mail concerning the Metal Industry Indicators to the following address:

U.S. Geological Survey
National Minerals Information Center
988 National Center
Reston, Virginia 20192

¹ Business Cycle Indicators, A monthly report from The Conference Board (March 1996).