

Metal Industry Indicators

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

January 2016

The primary metals leading index decreased in December, and its 6-month smoothed growth rate fell deeper into negative territory. The U.S. economy increased at a slower rate in the last quarter of 2015, with the manufacturing sector operating below its long-term trend. Moreover, advanced new orders for durable goods decreased in December, suggesting that the manufacturing sector's metals demand in 2016 is likely to decrease further. The construction sector is likely to increase metals consumption this year, as housing construction indicators suggest growth. The housing industry has underpinned primary metals industry activity despite a deceleration of nonresidential construction spending. The strength of the U.S. dollar and slow global economic growth continue to reduce U.S. metal products exports. Meanwhile, the level of metal imports remains high. The metals price leading index growth rate remained in positive territory in November, normally this would suggest that the decline in metal prices could slow in the near term. However, high global metal inventories and metal production is undermining any sustained price growth.

The **primary metals leading index** decreased 1.4% to 155.5 in December from a revised 157.7 in November. The index's 6-month smoothed growth rate, a compound annual rate that measures the near-term trend, decreased to -6.1% from a revised -4.3% in November. A growth rate above +1.0% is usually a sign of an upward near-term trend for future metals activity, whereas a growth rate below -1.0% indicates a downward trend. For an explanation of these indexes and a definition of the primary metals industry, see page 10.

Three of the four indicators that were available for the index's calculation decreased in December. A shorter average workweek in primary metals establishments contributed -0.9 percentage point to the net decrease in the leading index. A drop in the stock price index combining construction and farm machinery companies and industrial machinery companies contributed -0.6 percentage point. The PMI, the Institute for Supply Management's purchasing managers' index, fell below the threshold that denotes a decrease in future manufacturing activity for the second consecutive month in December. It made a -0.1-percentage point contribution. The USGS metals price index growth rate slowed its decline in December and made a 0.2-percentage-point contribution to the leading index. The primary metals leading index is subject to revision next month when the remaining four components become available.

The **primary metals leading index** growth rate is deep in negative territory, which indicates that activity in the primary metals industry is likely to decrease in the future. Advanced new orders for durable goods decreased sharply in December, particularly for transportation equipment, suggesting that the manufacturing sector is likely to decline in the near term. Advanced new orders for U.S. primary metals also declined

further, however, metal demand from the construction sector is likely to be higher this year. Low housing inventories, rising wages, and higher home prices should promote residential construction activity. Sales of new homes increased nearly 15% in 2015 and the high index for new housing permits indicates increased residential construction. However, construction activity growth in the nonresidential sector may not be as robust as in the housing industry, but could generate modest metal demand in the year ahead.

The **steel leading index** increased 0.1% to 111.5 in November from a revised 111.4 in October. Its 6-month smoothed growth rate increased to -3.1% from a revised -3.6% in October. Although the leading index increased, most of its indicators decreased in November. The rise in the index for new housing permits offset some of those declines. The rise in the M2 money supply growth rate also boosted the steel leading index. Despite reduced steel imports in 2015, import market share was still 29%, suppressing domestic steel industry activity. Moreover, the negative steel leading index growth rate suggests that industry activity will slow further in the near term.

The **copper leading index** increased 1.2% to 128.1 in November from a revised 126.6 in October, and its 6-month smoothed growth rate increased to 0.1% in November from a revised -2.3% in October. The construction sector related indicators, the index for new housing permits and the S&P stock price index for building products companies made the largest positive contributions to the net gain in the copper leading index. These indicators have generally increased since 2009, signifying the growth of the construction sector. Although construction is providing support to the domestic copper industry, activity is still likely to be slow because of large copper inventories. This is

reflected in the sharp decline in the LME copper price, which offset some the gains in the other leading index components.

High Global Metal Supplies Suppress Prices

The **leading index of metal prices** decreased 0.1% to 104.6 in November from a revised 104.7 in October and its 6-month smoothed growth rate decreased to 0.9% from a revised 1.0% in October. A dip in the trade-weighted average exchange value of other major currencies against the U.S. dollar growth rate, which is still deep in negative territory, contributed -0.5 percentage point to the net decrease in the leading index of metal prices. In contrast, a wider yield spread between the U.S. 10-year Treasury note and the federal funds rate contributed 0.2 percentage point. The increase in the growth rate in the inflation-adjusted value of new orders for U.S. nonferrous metal products contributed 0.1 percentage point. The Organization for Economic Cooperation and Development (OECD) Total Leading Index growth rate, which has been steadily declining for two years, flattened from August through October, and rose slightly in November. It

contributed 0.1 percentage point to the metal price leading index. The leading index of metal prices signals major changes in the growth rate of nonferrous metal prices an average of 8 months in advance.

The growth rate of the inflation-adjusted value of U.S. nonferrous metal products inventories, which is an indicator of supply and usually moves inversely with the price of metals, increased in November. The actual value of metals inventories held in United States increased to a new recent record high in November. Global metals over-production continued to increase despite slow global economic growth, low metal demand, and low prices, particularly in China, suppressing metals price growth.

The business cycle and inventories are only two factors in metal price determination. Some other factors that affect prices include changes in metals production, speculation, strategic stockpiling, foreign exchange rates, and production costs.

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

	Six-Month Smoothed Growth Rates						
	Leading Index of Metal Prices (1967=100)	Leading Index of Metal Prices Growth Rates	MII Nonferrous Metals Price Index	U.S. Nonferrous Metal Products Inventories (1982\$)	Primary Aluminum	Primary Copper	Steel Scrap
2014							
November	105.6	-4.8r	-8.9	9.1	24.0	-11.6	-26.6
December	104.8	-5.6	-14.6	8.4	-4.1	-14.5	-25.3
2015							
January	103.8	-6.5r	-28.6	13.0	-4.0	-33.0	-15.6
February	103.6r	-6.0	-21.3	12.6	-9.4	-21.5	-54.9
March	103.2	-6.0	-15.1	11.1	-10.4	-14.9	-51.8
April	103.1r	-5.4r	-4.5	11.3	0.5	-8.5	-47.3
May	104.0r	-3.1r	-10.7	7.1	-19.3	-11.7	-42.7
June	104.2	-1.9r	-20.1	8.4	-23.8	-19.6	-29.9
July	103.9r	-2.0r	-28.9	13.2r	-26.9	-30.1	-32.7
August	103.9r	-1.3r	-29.0	15.7	-28.1	-29.9	-42.1
September	104.3	-0.1r	-26.3	15.2	-23.7	-26.5	-43.5
October	104.7r	1.0r	-22.5	11.0r	-31.4	-22.1	-62.1
November	104.6	0.9	-31.7	12.8	-28.4	-33.7	-64.1
December	NA	NA	-22.9	NA	-17.8	-27.1	-58.1

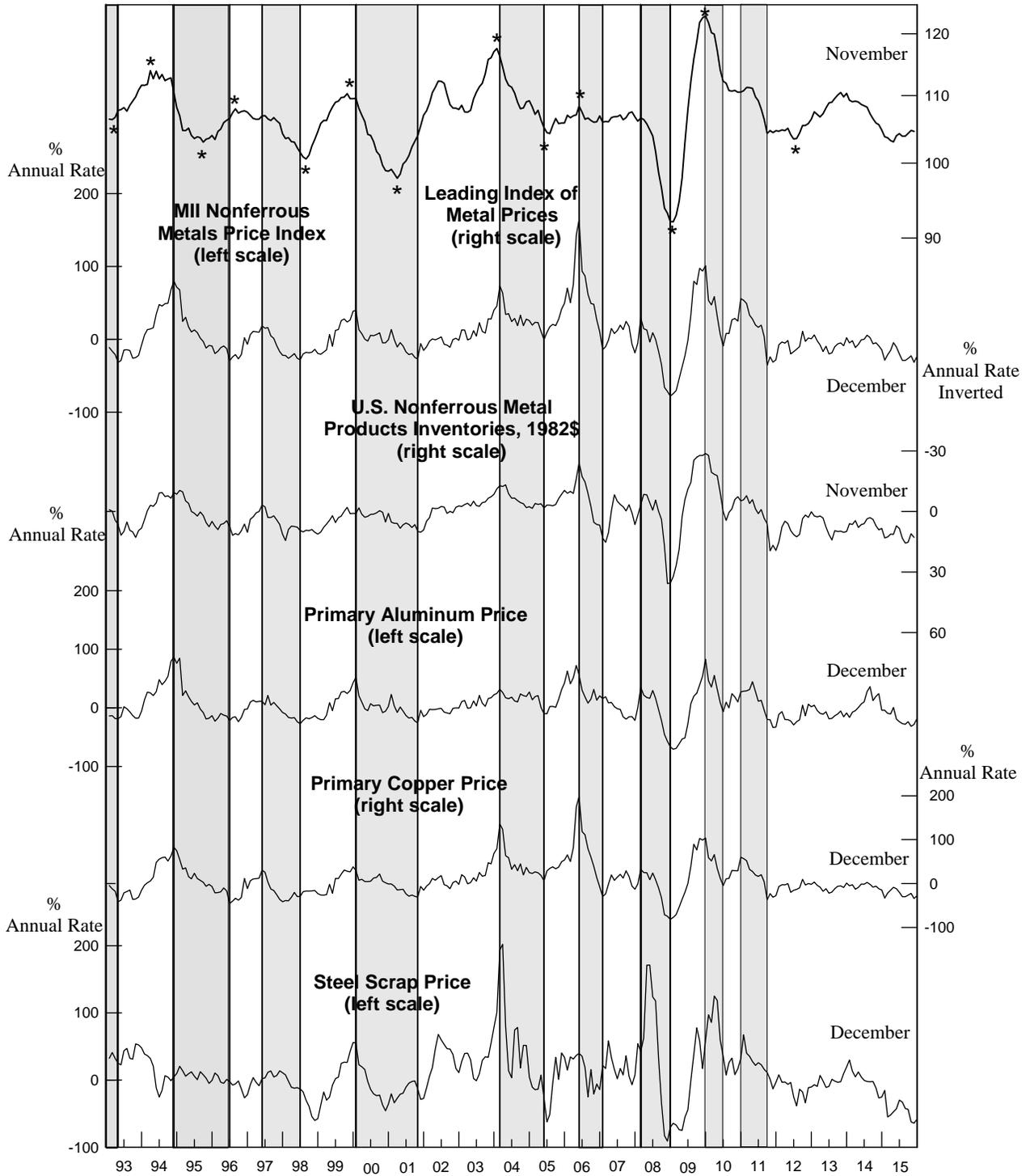
NA: Not available **r:** Revised

Sources: U.S. Geological Survey (USGS), American Metal Market (AMM), the London Metal Exchange (LME), U.S. Census Bureau, the Organization 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 Organization 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.
The Primary Metals Industry Indexes and Growth Rates

	Leading Index		Coincident Index	
	(1977 = 100)	Growth Rate	(1977 = 100)	Growth Rate
2014				
December	164.4	0.1	114.4	3.1
2015				
January	163.1	-1.6	113.4	0.9
February	163.0	-1.8	113.1	-0.1
March	159.7	-5.5	112.4	-1.5
April	161.1	-3.6	112.1	-2.1
May	162.5	-1.8	112.3	-1.8
June	163.1	-0.8	113.3	-0.2r
July	161.0	-3.0	113.4r	0.0r
August	159.7	-4.0	112.6r	-1.2r
September	157.5r	-5.9r	111.7	-2.6r
October	157.7r	-5.0r	111.7r	-2.1r
November	157.7r	-4.3r	111.6	-2.0
December	155.5	-6.1	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.
The Contribution of Each Primary Metals Index Component to the Percent Change in the Index from the Previous Month

Leading Index	November	December
1. Average weekly hours, primary metals (NAICS 331)	0.2r	-0.9
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)	-0.7	NA
4. USGS metals price index growth rate	-0.2	0.2
5. New orders, primary metal products, (NAICS 331 & 335929) 1982\$	0.0	NA
6. Index of new private housing units authorized by permit	0.5	NA
7. Growth rate of U.S. M2 money supply, 2009\$	0.2	NA
8. PMI	-0.2r	-0.1
Trend adjustment	0.0	0.0
Percent change (except for rounding differences)	0.0r	-1.5
Coincident Index	October	November
1. Industrial production index, primary metals (NAICS 331)	0.4r	-0.5
2. Total employee hours, primary metals (NAICS 331)	-0.4r	0.1
3. Value of shipments, primary metals products, (NAICS 331 & 335929) 1982\$	0.0r	0.2
Trend adjustment	0.1	0.1
Percent change (except for rounding differences)	0.1r	-0.1

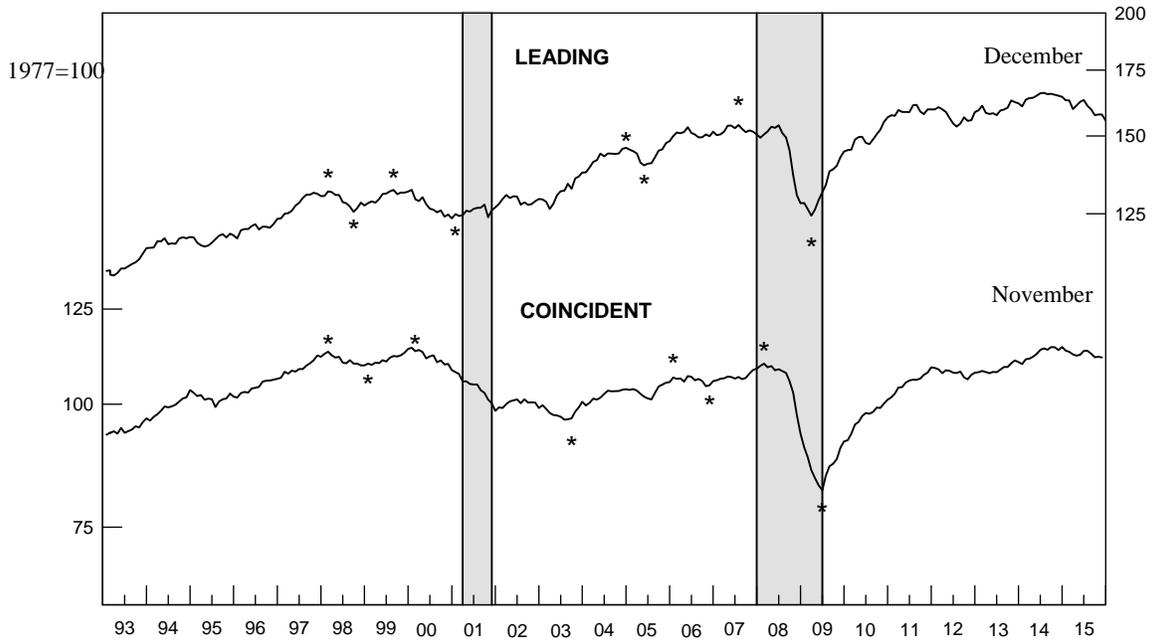
Sources: Leading: 1, Bureau of Labor Statistics; 2, Standard & Poor's and U.S. Geological Survey; 3, U.S. Geological Survey; 4, Journal of Commerce and U.S. Geological Survey; 5, U.S. Census Bureau and U.S. Geological Survey; 6, U.S. Census Bureau and U.S. Geological Survey; 7, Federal Reserve Board, 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.

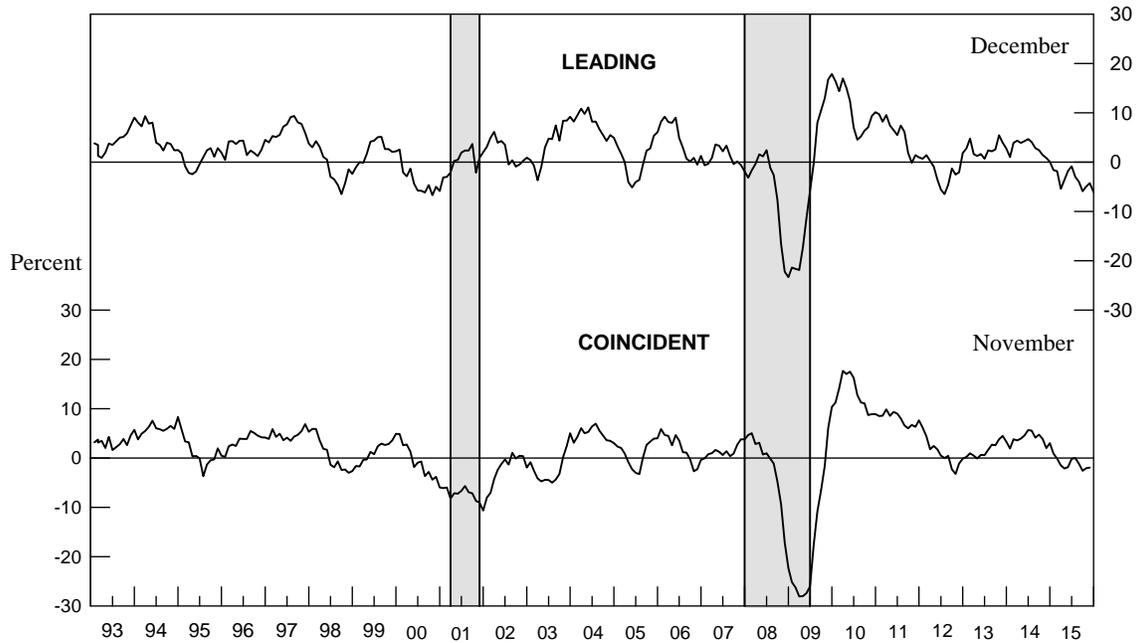
PRIMARY METALS: LEADING AND COINCIDENT INDEXES, 1993-2015 1977=100



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, 1993-2015 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.
The Steel Industry Indexes and Growth Rates

	<u>Leading Index</u>		<u>Coincident Index</u>	
	<u>(1977 = 100)</u>	<u>Growth Rate</u>	<u>(1977 = 100)</u>	<u>Growth Rate</u>
2014				
December	114.6	-0.1	121.3	3.1
2015				
January	114.0	-1.1	119.4	-0.3
February	114.5	-0.5	119.5	-0.4
March	113.1	-2.9	118.9	-1.5
April	113.4	-2.1	118.0	-3.1
May	113.9	-1.2	117.5	-3.6
June	113.3	-2.1	118.7	-1.6
July	112.6	-3.0	118.4	-2.1r
August	113.0	-2.0	118.5	-1.7
September	111.6	-3.8	117.4	-3.1
October	111.4r	-3.6r	117.7r	-2.2r
November	111.5	-3.1	116.9	-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.
The Contribution of Each Steel Index Component to the Percent Change in the Index from the Previous Month

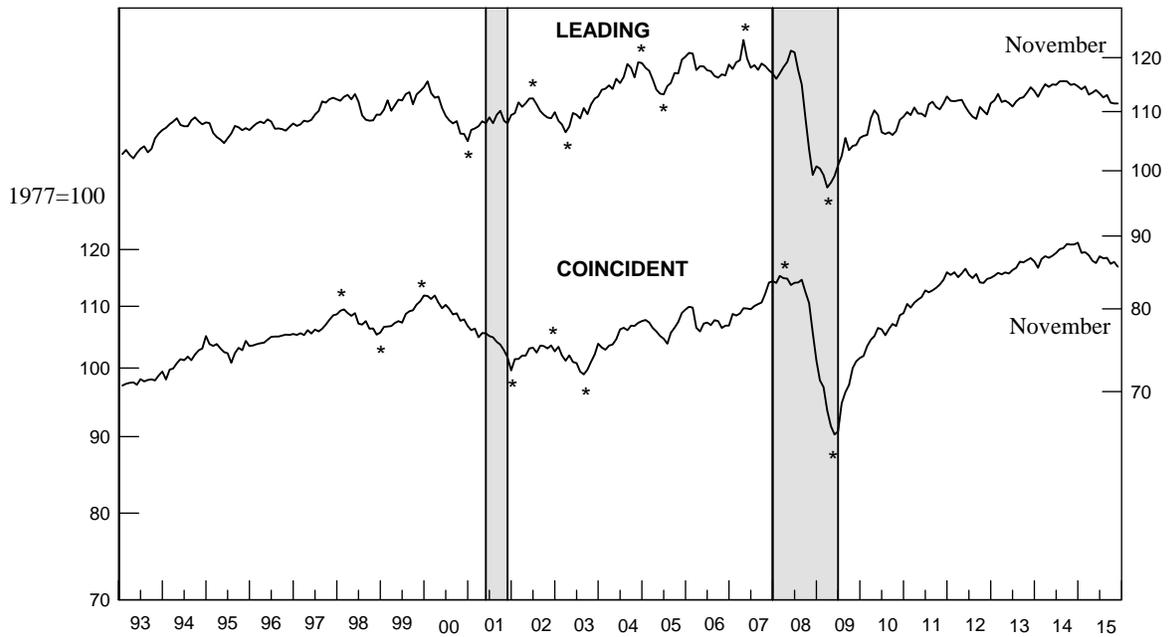
Leading Index	October	November
1. Average weekly hours, iron and steel mills (NAICS 3311 & 3312)	-0.3	-0.1
2. New orders, iron and steel mills (NAICS 3311 & 3312), 1982\$	0.4r	-0.1
3. Shipments of household appliances, 1982\$	0.1	-0.1
4. S&P stock price index, steel companies	0.1	0.1
5. Retail sales 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)	-0.2	-0.2
7. Index of new private housing units authorized by permit	0.2	0.5
8. Growth rate of U.S. M2 money supply, 2009\$	-0.4	0.2
9. PMI	0.0	-0.2
Trend adjustment	0.0	0.0
Percent change (except for rounding differences)	-0.2r	0.1
Coincident Index		
1. Industrial production index, iron and steel products (NAICS 3311 & 3312)	0.1r	-0.8
2. Value of shipments, iron and steel mills (NAICS 3311 & 3312), 1982\$	0.3r	0.2
3. Total employee hours, iron and steel mills (NAICS 3311 & 3312)	-0.3r	-0.2
Trend adjustment	0.1	0.1
Percent change (except for rounding differences)	0.2r	-0.7

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, 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, 1993-2015

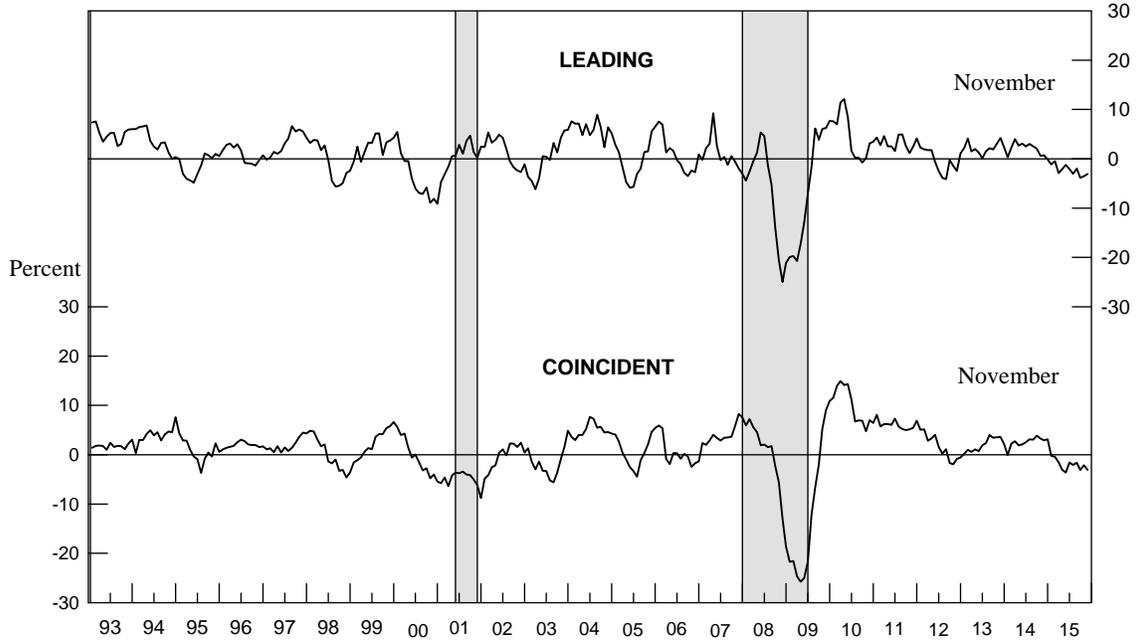
1977=100



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, 1993-2015

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.
The Copper Industry Indexes and Growth Rates**

	Leading Index		Coincident Index	
	(1977 = 100)	Growth Rate	(1977 = 100)	Growth Rate
2014				
December	128.8	1.8	109.4	1.6
2015				
January	126.3	-2.0	109.2	1.0
February	129.2	2.1	110.7	3.3
March	128.7	1.1	111.2	3.6
April	128.4	0.7	110.2	1.7
May	129.7	2.5	110.8	2.6
June	129.5	1.8	110.6	2.1
July	126.9	-2.1	109.5	0.4
August	128.2	-0.1	109.7	1.0
September	125.7	-3.8	106.1r	-4.9
October	126.6r	-2.3r	107.5r	-2.5r
November	128.1	0.1	108.6	-0.9

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

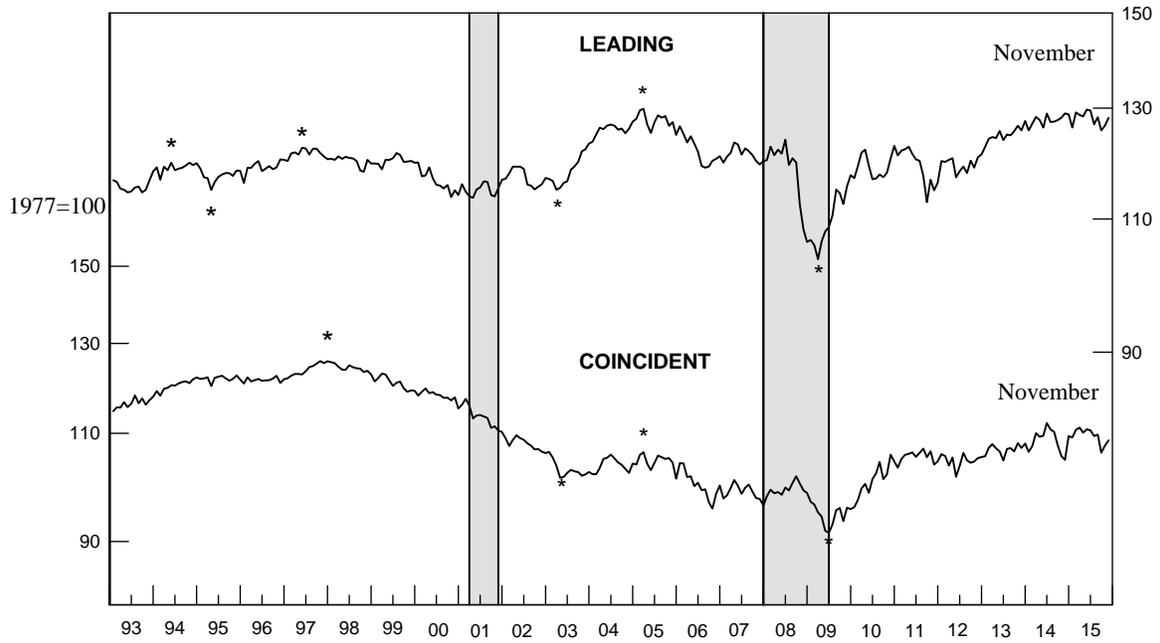
	October	November
Leading Index		
1. Average weekly hours, nonferrous metals (except aluminum) (NAICS 3314)	0.4	0.3
2. New orders, nonferrous metal products, (NAICS 3313, 3314, & 335929) 1982\$	0.0	0.1
3. S&P stock price index, building products companies	0.1r	0.5
4. LME spot price of primary copper	0.0	-0.5
5. Index of new private housing units authorized by permit	0.3	0.6
6. Spread between the U.S. 10-year Treasury Note and the federal funds rate	-0.1	0.2
Trend adjustment	0.0	0.0
Percent change (except for rounding differences)	0.7r	1.2
Coincident Index		
1. Industrial production index, primary smelting and refining of copper (NAICS 331411)	0.2r	0.1
2. Total employee hours, nonferrous metals (except aluminum) (NAICS 3314)	1.0	0.8
3. Copper refiners' shipments (short tons)	NA	NA
Trend adjustment	0.1	0.1
Percent change (except for rounding differences)	1.3r	1.0

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 NA: Not available

CHART 6.
COPPER: LEADING AND COINCIDENT INDEXES, 1993-2015

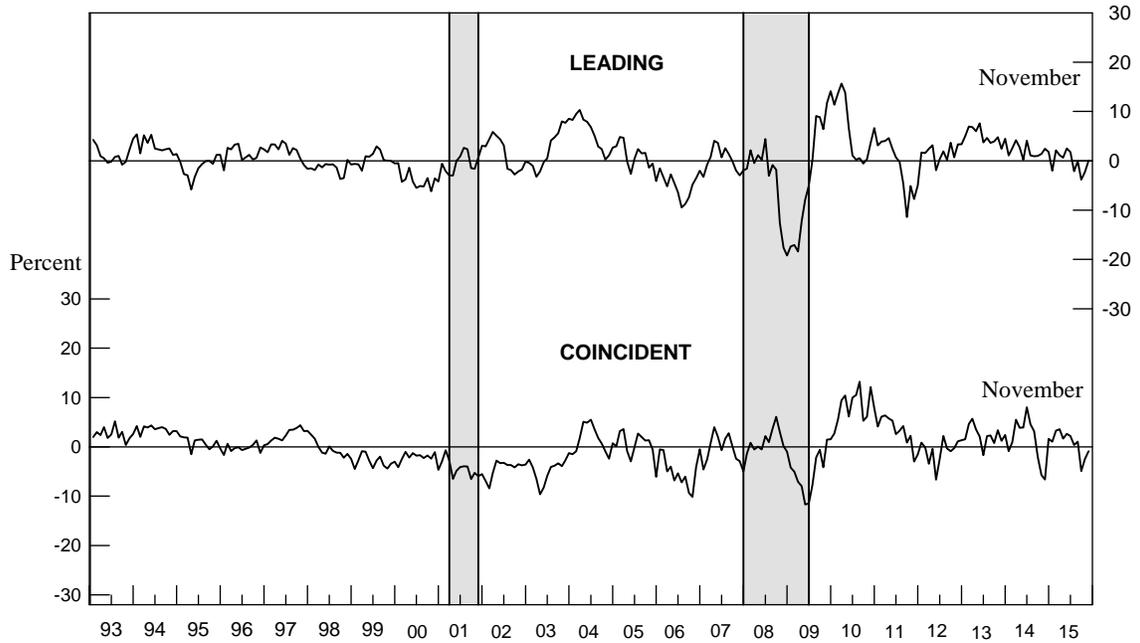
1977=100



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 7.
COPPER: LEADING AND COINCIDENT GROWTH RATES, 1993-2015

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.

Explanation

Each month, the U.S. Geological Survey tracks the effects of the business cycle on five 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 five metal industries, primary metals (NAICS 331) is the broadest, containing 25 different metal processing industries. Steel, aluminum, 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. In general, metal industry indexes starting in 1997 begin to reflect the NAICS classification, while indexes for earlier years follow the SIC. Hence, composite indexes from 1997 forward are not entirely consistent with those of earlier years.

The largest change to primary metals because of the NAICS deals with other communication and energy wire manufacturing (NAICS 335929). Under NAICS, this manufacturing has been removed from primary metals and added to electrical equipment, appliance, and component manufacturing. Because monthly shipments and new orders for this wire are not available, the USGS is estimating their values from 1997 onward and adding them to the appropriate metal industry indicators and indexes to maintain consistency.

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

There are other small changes to the primary metals industry because of the switch to the NAICS. Coke oven activity not done by steel mills, for example, is removed and alumina refining, a part of industrial inorganic chemical manufacturing under the SIC, is added. Because the historical trends of the composite indexes are not affected by these small changes, the USGS is not making specific adjustments to the indexes for them for the periods before and after 1997.

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. EST, Friday, February 19. 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 Gail James (703-648-4915; e-mail: gjames@usgs.gov). 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