

Metal Industry Indicators

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

October 2015

The primary metals leading index decreased in September for the third consecutive month, and its 6-month smoothed growth rate declined further into negative territory. The U.S. manufacturing sector has reduced its metals demand this year and declining new orders for durable goods suggest that its metals demand is likely to decrease further in the near term. Activity in the construction sector has been stronger and has underpinned the primary metals industry with modest metals consumption. The housing industry has promoted metals demand, however; this sharp acceleration is likely to slow in the months ahead. The strength of the U.S. dollar and slow global economic growth continued to suppress U.S. metal products exports; meanwhile, the level of metal imports is still high. The negative metals price leading index growth rate in August indicates further decreases in most metal prices.

The **primary metals leading index** decreased 2.4% to 156.8 in September from a revised 160.7 in August. The index's 6-month smoothed growth rate, a compound annual rate that measures the near-term trend, decreased to -6.8% from a revised -2.9% in August. 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 September. A shorter average workweek in primary metals establishments made the largest negative contribution, -1.3-percentage-point, to the net decrease in the leading index. The stock price index combining construction and farm machinery companies and industrial machinery companies continued its downward trend and contributed -1.0 percentage point. The PMI, the Institute for Supply Management's purchasing managers' index, decreased to its lowest level in over 2 years and contributed -0.2 percentage point. The PMI moved close to the threshold that denotes a decrease in future manufacturing activity. In contrast, the USGS metals price index growth rate edged up in September, contributing 0.1 percentage point. 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 has fallen deep into negative territory, which suggests that activity growth in primary metals industry could decelerate in the near future. Consumer spending, which accounts for 70% of the GDP, edged up only slightly in September. Furthermore, new orders for durable goods declined sharply in August and September. New orders in the transportation industry also declined. However,

orders for automotive equipment, which is the bulk of this equipment, increased slightly in September. Much of the metal demand from the automotive industry has been met by cheaper imports of aluminum and steel. Metals demand from the construction sector has been steadier. Low housing inventories, higher wages, and rising home prices promoted residential construction activity. However, slower employment growth may hinder this trend in the near future.

The **steel leading index** increased 0.4% to 113.2 in August from 112.7 in July. Its 6-month smoothed growth rate increased to -1.6% from a revised -2.8% in July. A longer average workweek in iron and steel plants had the most positive effect on the steel leading index in August. Increased new orders for steel products and the rising M2 money supply growth rate also lifted the leading index. Upticks in the S&P stock price index for iron and steel companies and the index for new housing permits also added to the increase in the steel leading index. In contrast, the steel scrap price growth rate continued to decline; offsetting some of those gains. Although steel imports decreased nearly 10% in September, year-to-date finished steel imports still claim a 30% market share. The steel leading index growth rate is still negative and suggests that industry activity will slow in the near term.

The **copper leading index** increased 1.1% to 128.3 in August from a revised 126.9 in July, and its 6-month smoothed growth rate settled at zero in August from a revised -2.1% in July. The large contributions from the longer average workweek in nonferrous metals, except aluminum, plants and the jump in the S&P stock price index for building products companies accounted for nearly all of the gain in the leading index. The copper price continued to fall and the yield spread between the U.S. 10-year Treasury

note and the federal funds rate tightened. Growth in the residential construction sector has been underpinning domestic copper industry activity this year. However, the construction sector is beginning to slow. High U.S. copper inventories are likely to have a negative effect on the domestic copper industry in the future.

Slow Global Economic Growth Continue to Suppress Prices

The **leading index of metal prices** edged down 0.1% to 103.9 in August from a revised 104.0 in July; however, its 6-month smoothed growth rate increased to -1.4% from a revised -1.9% in July. The Organization for Economic Cooperation and Development (OECD) Total Leading Index growth rate, which has been steadily declining, made a -0.3-percentage-point contribution to the net decline in the leading index of metal prices in August. A tighter yield spread between the U.S. 10-year Treasury note and the federal funds rate contributed -0.2 percentage point. In contrast, a rise in the trade-weighted average exchange value of other major currencies against the U.S. dollar growth rate contributed 0.3 percentage point. The growth rate in the inflation-adjusted value of new orders for U.S. nonferrous

metal products doubled in August and contributed 0.1 percentage point to the leading index of metal prices. 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 August. The actual value of metals inventories held in United States increased in August, reaching a new recent record. However, physical levels of LME and other warehouse inventories have decreased; copper inventories have declined sharply in the last 2 months. Nonetheless, slowing global economic growth is reducing metals demand; subsequently suppressing metals prices. Although the metals price leading index growth rate is still negative, it has generally trended up this year, suggesting that an uptick in economic activity could slow some metal price declines.

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							
August	107.2	-3.6	2.2	3.1	36.0	-1.7	-2.5
September	106.5r	-4.5	-6.1	3.9	12.2	-8.1	-2.0
October	105.8r	-5.2	-4.7	7.0	19.7	-5.7	-11.6
November	105.5r	-5.0	-8.9	9.1	24.0	-11.6	-26.6
December	104.7r	-5.7r	-14.6	8.4	-4.1	-14.5	-25.3
2015							
January	103.8r	-6.5r	-28.6	13.0	-4.0	-33.0	-15.6
February	103.6r	-6.0r	-21.3	12.6	-9.4	-21.5	-54.9
March	103.3r	-5.9	-15.1	11.1	-10.4	-14.9	-51.8
April	103.2r	-5.3	-4.5	11.3	0.5	-8.5	-47.3
May	104.1r	-2.9r	-10.7	7.7	-19.3	-11.7	-42.7
June	104.3r	-1.8r	-20.1	8.3	-23.8	-19.6	-29.9
July	104.0r	-1.9r	-28.9	13.4r	-26.9	-30.1	-32.7
August	103.9	-1.4	-29.0	16.1	-28.1	-29.9	-42.1
September	NA	NA	-26.3	NA	-23.1	-26.5	-43.5

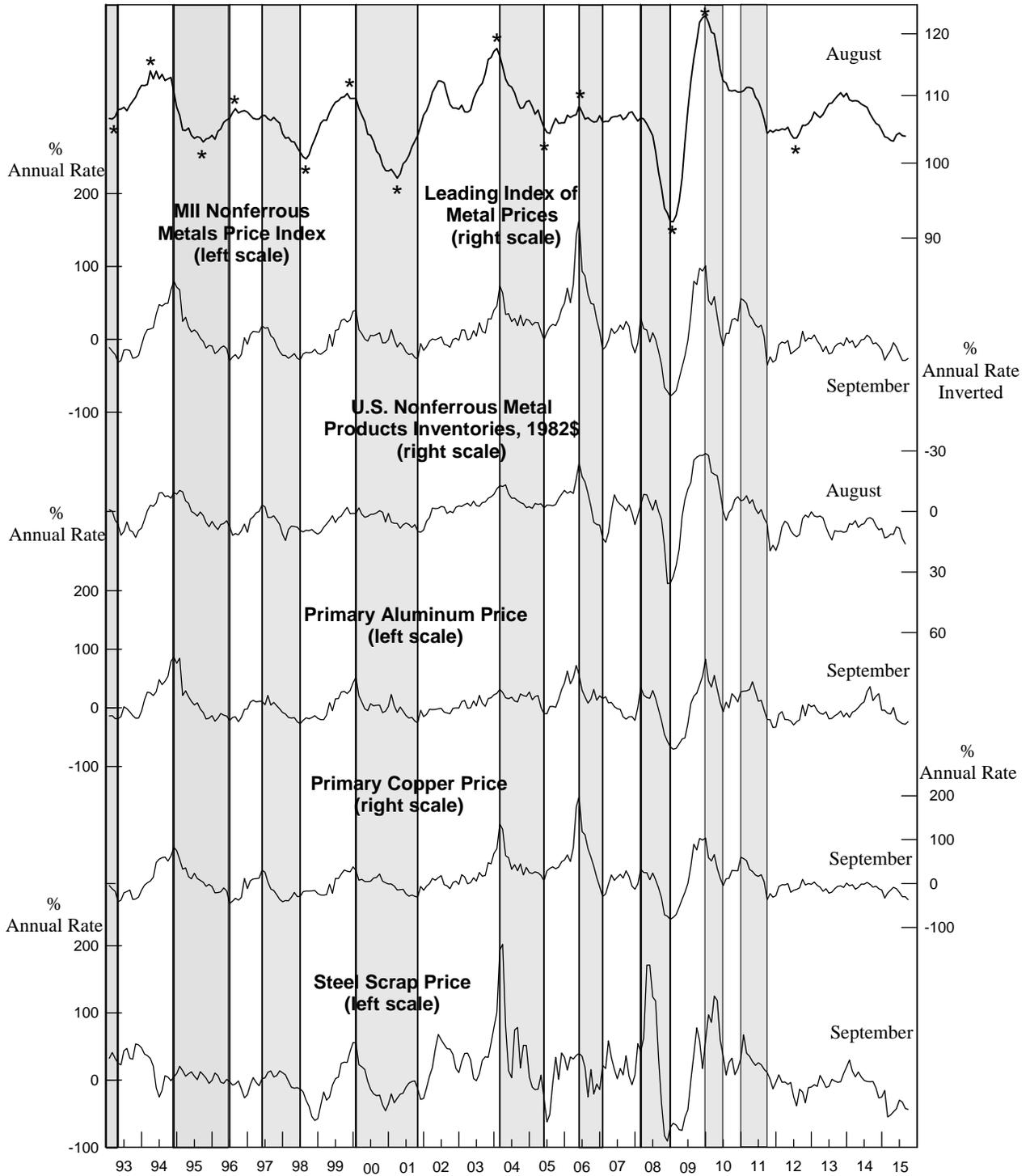
NA: Not available r: Revised

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				
September	165.6	2.4	114.3	4.7
October	165.2	1.4	114.3	3.9
November	164.8	0.8	113.5	2.0
December	164.3	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	161.1r	-3.5	112.1	-2.0
May	162.8r	-1.4r	112.5r	-1.5r
June	163.3r	-0.7r	113.4r	-0.1r
July	161.3r	-2.7r	113.5r	0.2r
August	160.7r	-2.9r	113.5	0.2
September	156.8	-6.8	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	August	September
1. Average weekly hours, primary metals (NAICS 331)	0.1r	-1.3
2. Weighted S&P stock price index, machinery, construction and farm and industrial (December 30, 1994=100)	-0.4r	-1.0
3. Ratio of price to unit labor cost (NAICS 331)	-0.1	NA
4. USGS metals price index growth rate	-0.2r	0.1
5. New orders, primary metal products, (NAICS 331 & 335929) 1982\$	0.1	NA
6. Index of new private housing units authorized by permit	0.1	NA
7. Growth rate of U.S. M2 money supply, 2009\$	0.2	NA
8. PMI	-0.2r	-0.2
Trend adjustment	0.0	0.0
Percent change (except for rounding differences)	-0.4r	-2.4
Coincident Index	July	August
1. Industrial production index, primary metals (NAICS 331)	0.0	0.0
2. Total employee hours, primary metals (NAICS 331)	0.2	-0.1
3. Value of shipments, primary metals products, (NAICS 331 & 335929) 1982\$	-0.1r	0.0
Trend adjustment	0.1	0.1
Percent change (except for rounding differences)	0.2	0.0

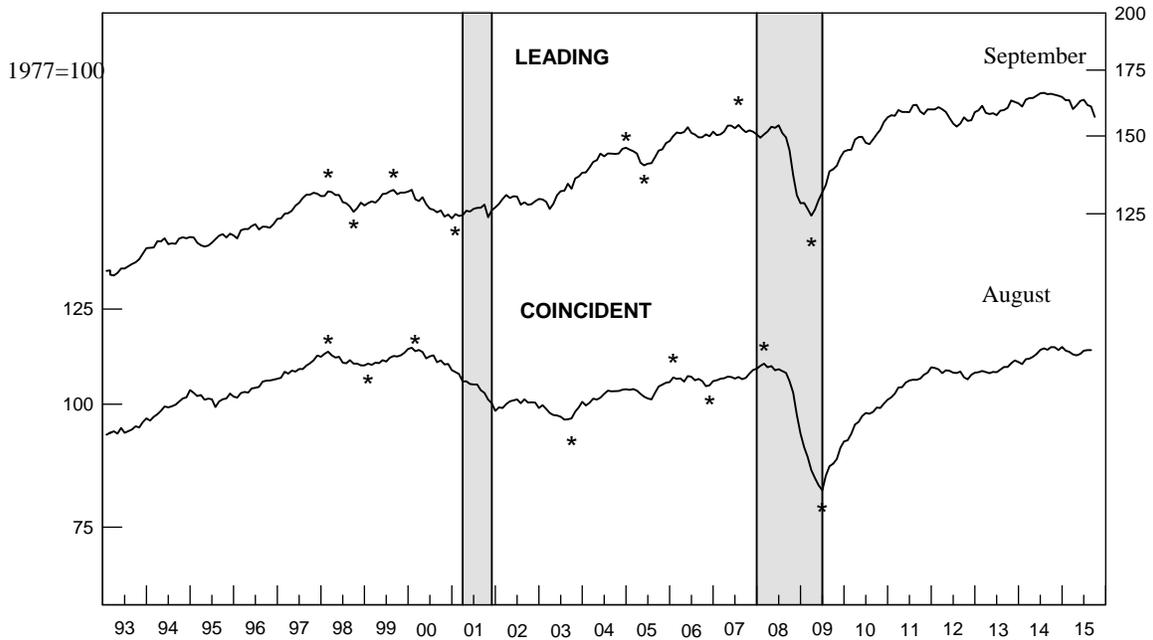
Sources: Leading: 1, Bureau of Labor Statistics; 2, Standard & Poor's and U.S. Geological Survey; 3, U.S. Geological Survey; 4, Journal of Commerce and U.S. Geological Survey; 5, U.S. Census Bureau and U.S. Geological Survey; 6, U.S. Census Bureau and U.S. Geological Survey; 7, Federal Reserve Board,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

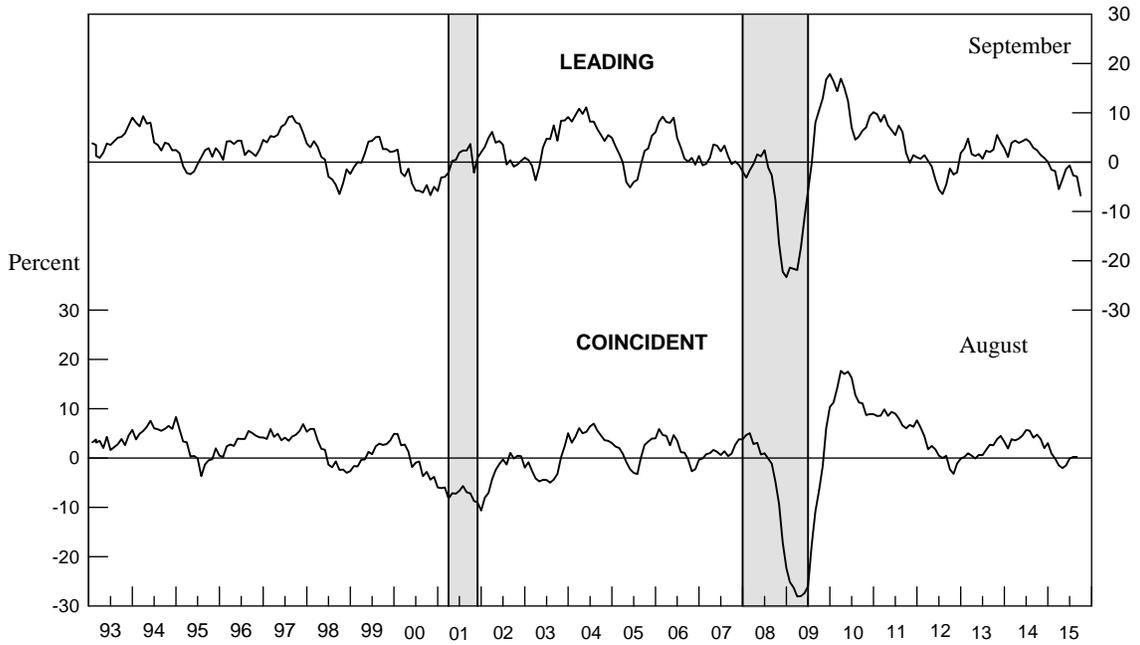
PRIMARY METALS: LEADING AND COINCIDENT INDEXES, 1993-2015 1977=100



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				
September	115.5	2.0	121.0	3.9
October	114.9	0.6	120.9	3.3
November	115.0	0.6	121.0	2.9
December	114.6	-0.1	121.3	3.1
2015				
January	114.0	-1.1	119.4	-0.3
February	114.6	-0.5	119.5	-0.4
March	113.1	-2.9	118.9	-1.5
April	113.4r	-2.1r	118.0	-3.1r
May	114.0	-1.1	117.5	-3.7
June	113.4	-1.9	118.8	-1.6
July	112.7	-2.8r	118.4	-2.0
August	113.2	-1.6	119.3	-0.4

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	July	August
1. Average weekly hours, iron and steel mills (NAICS 3311 & 3312)	0.3	0.3
2. New orders, iron and steel mills (NAICS 3311 & 3312), 1982\$	0.0	0.2
3. Shipments of household appliances, 1982\$	0.1	-0.1
4. S&P stock price index, steel companies	-0.5	0.1
5. Retail sales of U.S. passenger cars and light trucks (units)	0.2	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	-0.8	0.1
8. Growth rate of U.S. M2 money supply, 2009\$	0.1	0.2
9. PMI	-0.1	-0.2
Trend adjustment	0.0	0.0
Percent change (except for rounding differences)	-0.6	0.4
Coincident Index		
1. Industrial production index, iron and steel products (NAICS 3311 & 3312)	-0.1r	0.1
2. Value of shipments, iron and steel mills (NAICS 3311 & 3312), 1982\$	-0.1r	0.2
3. Total employee hours, iron and steel mills (NAICS 3311 & 3312)	-0.2r	0.4
Trend adjustment	0.1	0.1
Percent change (except for rounding differences)	-0.3r	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, 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

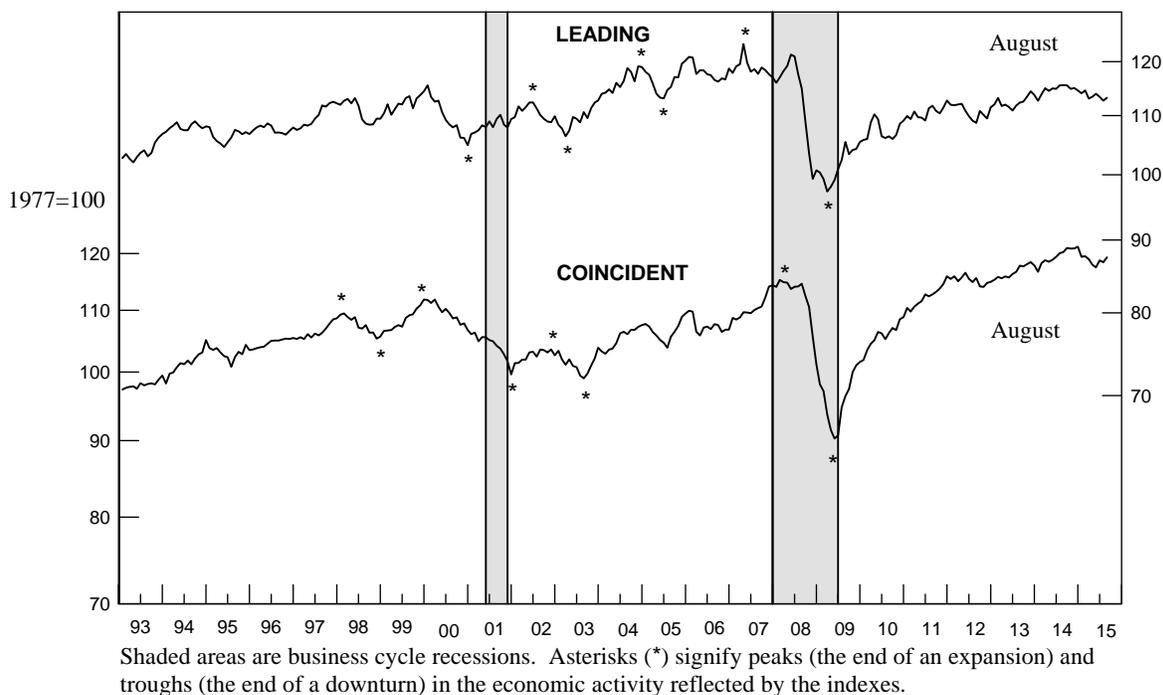
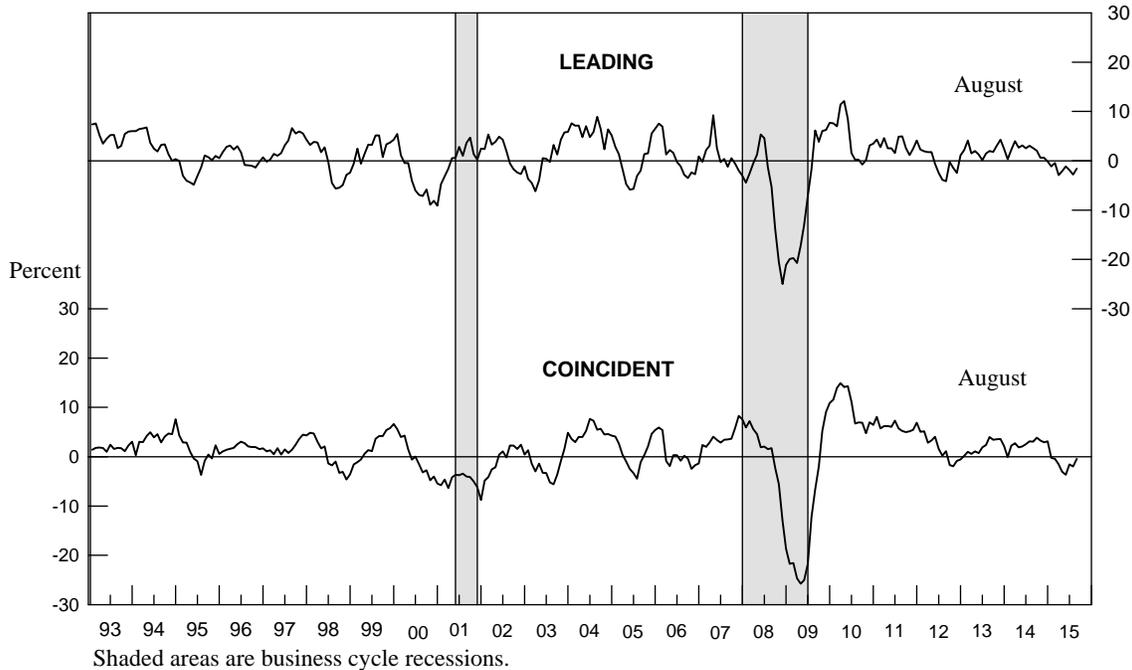


CHART 5.
STEEL: LEADING AND COINCIDENT GROWTH RATES, 1993-2015

Percent



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**

	<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				
September	127.7	1.0	107.5	-2.1
October	128.1	1.4	105.4	-5.8
November	129.0	2.4	104.7	-6.6
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	110.2r	1.6r
May	129.7	2.5	111.3r	3.4r
June	129.5	1.8	110.2r	1.4r
July	126.9r	-2.1r	109.7r	0.8r
August	128.3	0.0	109.5	0.5

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**

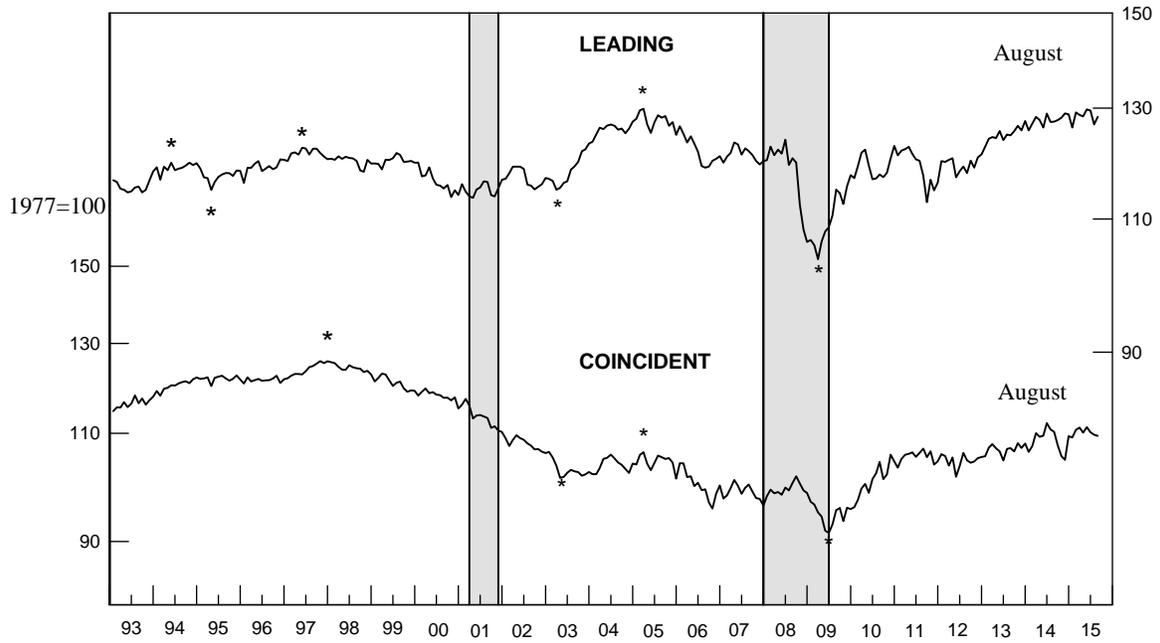
Leading Index	July	August
1. Average weekly hours, nonferrous metals (except aluminum) (NAICS 3314)	-0.6r	0.7
2. New orders, nonferrous metal products, (NAICS 3313, 3314, & 335929) 1982\$	0.1	0.1
3. S&P stock price index, building products companies	-0.1	0.5
4. LME spot price of primary copper	-0.5	-0.1
5. Index of new private housing units authorized by permit	-1.0	0.1
6. Spread between the U.S. 10-year Treasury Note and the federal funds rate	0.0	-0.1
Trend adjustment	0.0	0.0
Percent change (except for rounding differences)	<u>-2.1r</u>	<u>1.2</u>
Coincident Index		
1. Industrial production index, primary smelting and refining of copper (NAICS 331411)	-0.3	-0.3
2. Total employee hours, nonferrous metals (except aluminum) (NAICS 3314)	-0.2r	0.0
3. Copper refiners' shipments (short tons)	NA	NA
Trend adjustment	0.1	0.1
Percent change (except for rounding differences)	<u>-0.4r</u>	<u>-0.2</u>

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

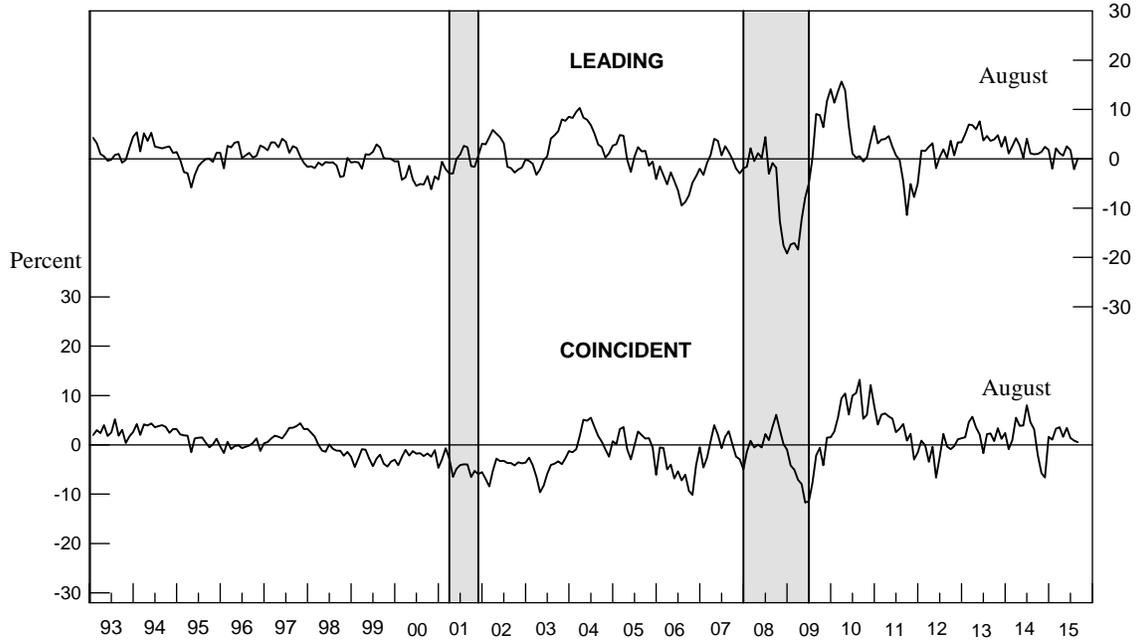
1977=100



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, November 13. 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
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