Metal Industry Indicators

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

July 2015

The primary metals leading index decreased in June, and its 6-month smoothed growth rate moved further into negative territory. U.S. manufacturing activity has been flat this year with reduced metals consumption as compared to last year. Although advanced new orders for durable goods increased in June, most of that increase can be attributed to the rise in the volatile aerospace industry, indicating slow to modest metals demand from the manufacturing sector in the second half of 2015. However, activity in the construction sector is accelerating sharply; this is likely to increase metals demand in the near future. The strength of the U.S. dollar and slow global economic growth is suppressing U.S. metal products exports. Meanwhile, although steel imports have decreased since the start of the year, other metal imports are still high. The negative metals price leading index growth rate in May indicates further decreases in most metal prices.

The **primary metals leading index** decreased -0.2% to 163.4 in June from a revised 163.7 in May. The index's 6-month smoothed growth rate, a compound annual rate that measures the near-term trend, decreased to -1.6% from a revised -1.5% in May. 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.

Two of the four indicators that were available for the index's calculation decreased in June. The USGS metals price index growth rate resumed its downward trend, after a 1-month uptick, in June. It contributed -0.4 percentage point to the net decrease in the leading index. The stock price index combining construction and farm machinery companies and industrial machinery companies fell in June and made a -0.2-percentage-point contribution. In contrast, a slightly longer average workweek in primary metals establishments contributed 0.2 percentage point. The PMI, the Institute for Supply Management's purchasing managers' index, also contributed 0.2 percentage point. The PMI has moved well above the threshold that denotes an increase in future manufacturing activity. 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 suggests that primary metals industry activity is likely to slow in the near term. Manufacturing activity has been flat in 2015, with limited metals demand, although advanced new orders for durable goods increased in June, reflecting increases in orders in the transportation industry. Much of the increase was generated by the volatile aerospace equipment industry, orders for automotive equipment increased only slightly. Advanced orders for primary metals actually declined. In contrast, the construction sector is accelerating. Low housing inventories and rising home prices are promoting residential construction activity. Moreover, residential construction activity is likely to be concentrated in apartment building activity as indicated by an 80% increase the index of new housing permits for multi-unit buildings from last June.

The **steel leading index** increased 0.6% to 114.1 in May from 113.4 in April. Its 6-month smoothed growth rate increased to -0.9% from a revised -2.1% in April. Six of its nine indicators increased, with another sharp increase in the index of new housing permits issued making the largest positive contribution. A surge in car and light truck sales also pushed the steel leading index higher in May. The positive contributions from these indicators were offset by the declining inflation-adjusted M2 money supply growth rate and the shorter average workweek in iron and steel mills in recent months. Steel imports have been declining since January but still claim a 32% market share and is suppressing U.S. steel industry activity growth. Several U.S. steel companies have filed a petition with the federal government to impose anti-dumping measures on 8 countries exporting into the United States.

The **copper leading index** increased 1.1% to 129.8 in May from a revised 128.4 in April, and its 6-month smoothed growth rate increased to 2.6% from a revised 0.7% in April. Four of its six indicators increased in May, with the rising index of new housing permits issued making the largest positive contribution to leading index. In contrast, a decrease in the inflation-adjusted

new orders for nonferrous metal products and a drop in the price of copper held the leading index back in May. The positive leading index growth rate is suggesting that activity in the copper industry could increase. The accelerating construction sector could support copper industry activity in the near term.

Ample Metals Inventories Stifle Price Growth

The **leading index of metal prices** increased 0.8% to 103.6 in May from a revised 102.8 in April, and its 6-month smoothed growth rate increased to -3.4% from a revised -5.8% in April. A rise in the trade-weighted average exchange value of other major currencies against the U.S. dollar growth rate contributed 0.9 percentage point to the leading index of metal prices. A wider yield spread between the U.S. 10-year Treasury note and the federal funds rate also contributed 0.3 percentage point. In contrast, the Organization for Economic Cooperation and Development (OECD) Total Leading Index growth rate, which has steadily declined for nearly 3 years, contributed -0.2 percentage point. The second consecutive negative growth rate in the inflation-adjusted value of new orders for U.S. nonferrous metal products 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, declined sharply in May. Although the level of metals inventories held in United States slipped slightly in May, metal inventories are still near the highest level in recent history. LME and other warehouse inventories also continued to rise. These high global inventories are exceeding metals demand and stifling price growth. Moreover, the negative metals price leading index growth rate indicate further metal price decreases.

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

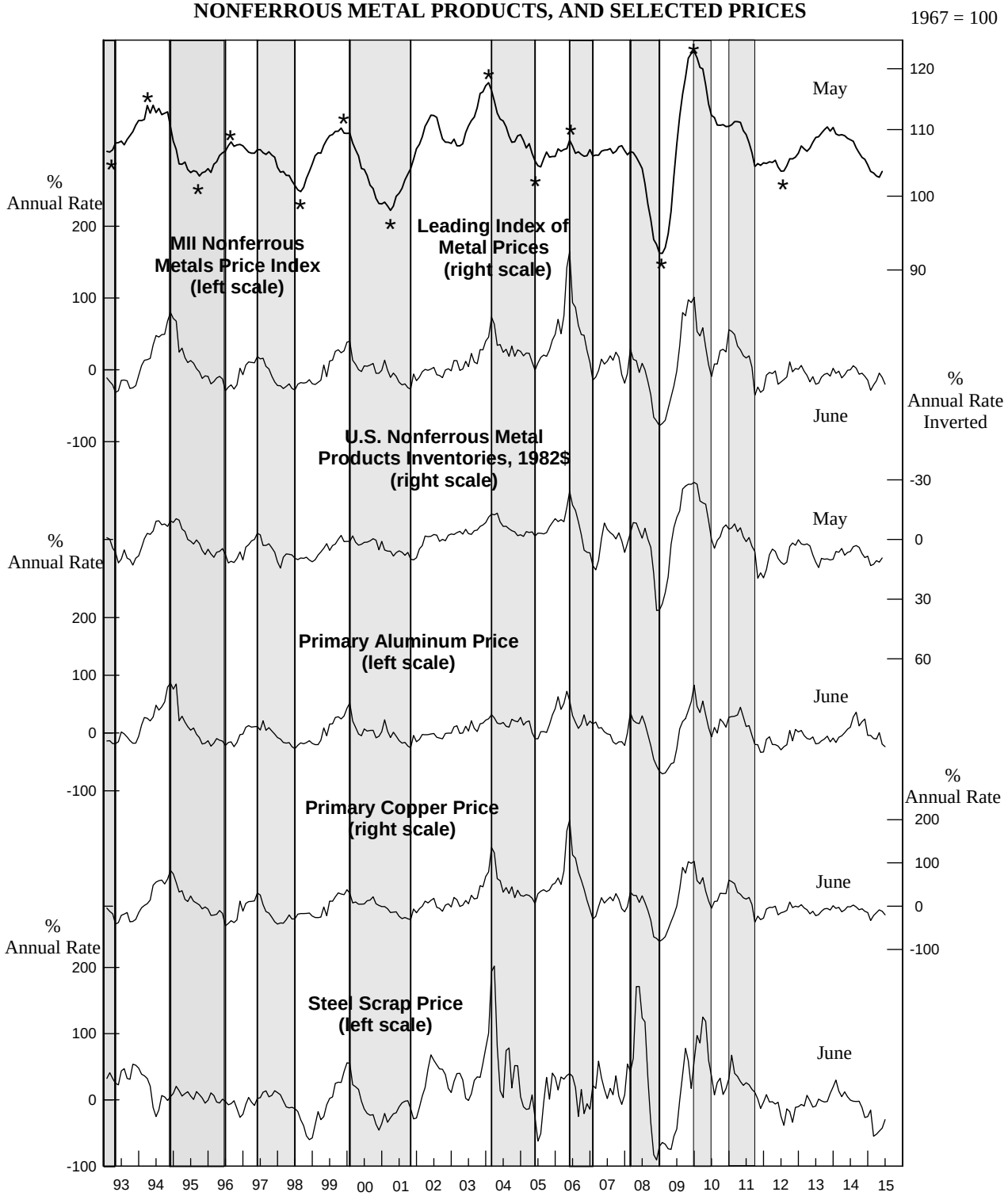
		Six-Month Smoothed Growth Rates					
	Leading Index of Metal Prices (1967=100)	Leading Index of Metal Prices Growth Rates	MII Nonferrous Metals Price Index	U.S. Nonferrous Metal Products Inventories (1982$)	Primary Aluminum	Primary Copper	Steel Scrap
2014							
May	108.6	-1.2	-0.7	6.5	6.7	-1.0	4.7
June	108.4	-1.7	-0.1	6.0	10.2	-1.5	-0.4
July	108.2r	-2.0	5.7	3.5	27.8	2.8	-1.9
August	107.2r	-3.6	2.2	3.1	36.0	-1.7	-2.5
September	106.4	-4.5r	-6.1	3.9	12.2	-8.1	-2.0
October	105.7	-5.2	-4.7	7.0	19.7	-5.7	-11.6
November	105.4	-5.0	-8.9	9.1	24.0	-11.6	-26.6
December	104.6	-5.9r	-14.6	8.4	-4.1	-14.5	-25.3
2015							
January	103.6	-6.7	-28.6	13.0r	-4.0	-33.0	-15.6
February	103.4	-6.3r	-21.3	12.5	-9.4	-21.5	-54.9
March	102.9r	-6.3r	-15.1	10.6r	-10.4	-14.9	-51.8
April	102.8r	-5.8r	-4.5	11.4r	0.5	-8.5	-47.3
May	103.6	-3.4	-10.7	9.2	-19.3	-11.7	-42.7
June	NA	NA	-20.1	NA	-23.8	-19.6	-29.9

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



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.

U.S. Geological Survey, July 2015

Table 2.
The Primary Metals Industry Indexes and Growth Rates

	Leading Index		Coincident Index	
	(1977 = 100)	Growth Rate	(1977 = 100)	Growth Rate
2014				
June	166.9	5.1	114.8	6.7
July	167.2	4.6	115.3	6.5
August	166.7	3.3	114.9	4.9
September	166.5	2.4	115.3	4.8
October	165.9	1.2	115.1	3.8
November	165.6	0.7	114.4	1.9
December	165.4	0.1r	115.5	3.3
2015				
January	164.1r	-1.6	114.5	1.0r
February	163.7	-2.2	113.8	-0.6
March	160.2	-6.0r	112.9	-2.3
April	162.0r	-3.6r	113.0r	-2.3r
May	163.7r	-1.5r	113.5	-1.5
June	163.4	-1.6	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.
The Contribution of Each Primary Metals Index Component to the Percent Change in the Index from the Previous Month

Leading Index	**May**	**June**
1. Average weekly hours, primary metals (NAICS 331)	0.4r	0.2
2. Weighted S&P stock price index, machinery, construction and farm and industrial (December 30, 1994=100)	0.2r	-0.2
3. Ratio of price to unit labor cost (NAICS 331)	-0.1	NA
4. USGS metals price index growth rate	0.1r	-0.4
5. New orders, primary metal products, (NAICS 331 & 335929) 1982$	0.1	NA
6. Index of new private housing units authorized by permit	0.5	NA
7. Growth rate of U.S. M2 money supply, 2009$	-0.4	NA
8. PMI	0.2r	0.2
Trend adjustment	0.0	0.0
Percent change (except for rounding differences)	1.0r	-0.2

Coincident Index	**April**	**May**
1. Industrial production index, primary metals (NAICS 331)	0.3r	0.1
2. Total employee hours, primary metals (NAICS 331)	-0.2r	0.2
3. Value of shipments, primary metals products, (NAICS 331 & 335929) 1982$	-0.1	0.1
Trend adjustment	0.1	0.1
Percent change (except for rounding differences)	0.1	0.5

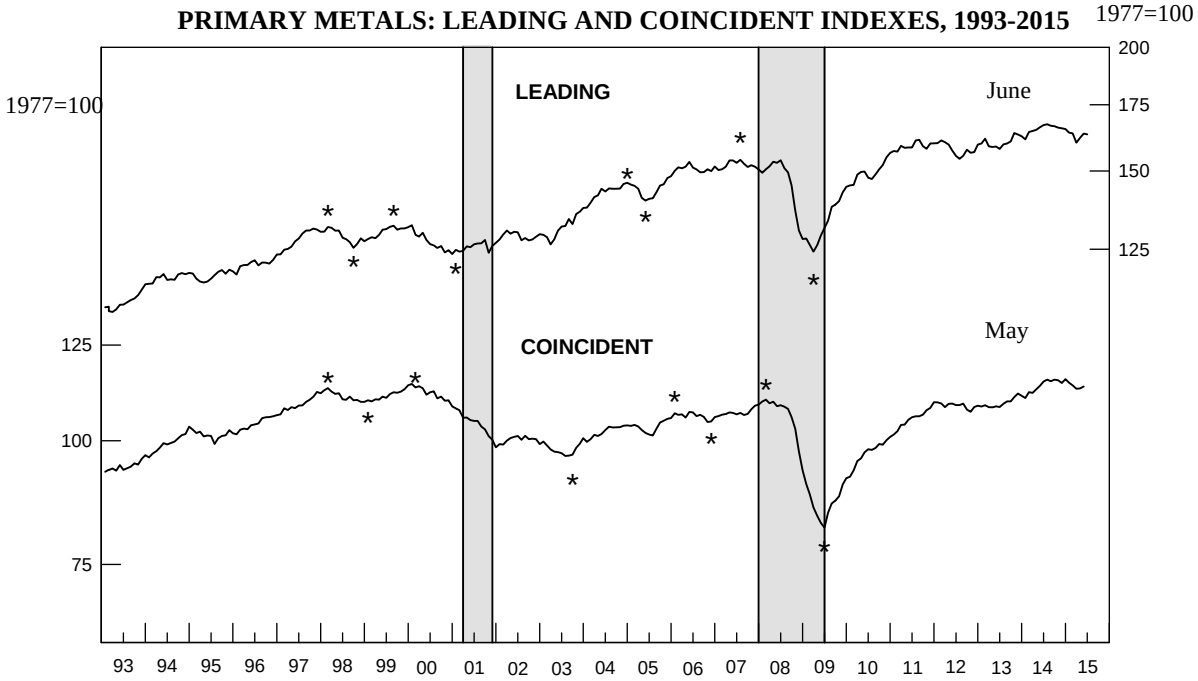
Sources: Leading: 1, Bureau of Labor Statistics; 2, Standard & Poor's and U.S. Geological Survey; 3, U.S. Geological Survey; 4, Journal of Commerce and U.S. Geological Survey; 5, U.S. Census Bureau and U.S. Geological Survey; 6, U.S. Census Bureau and U.S. Geological Survey; 7, Federal Reserve Board,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

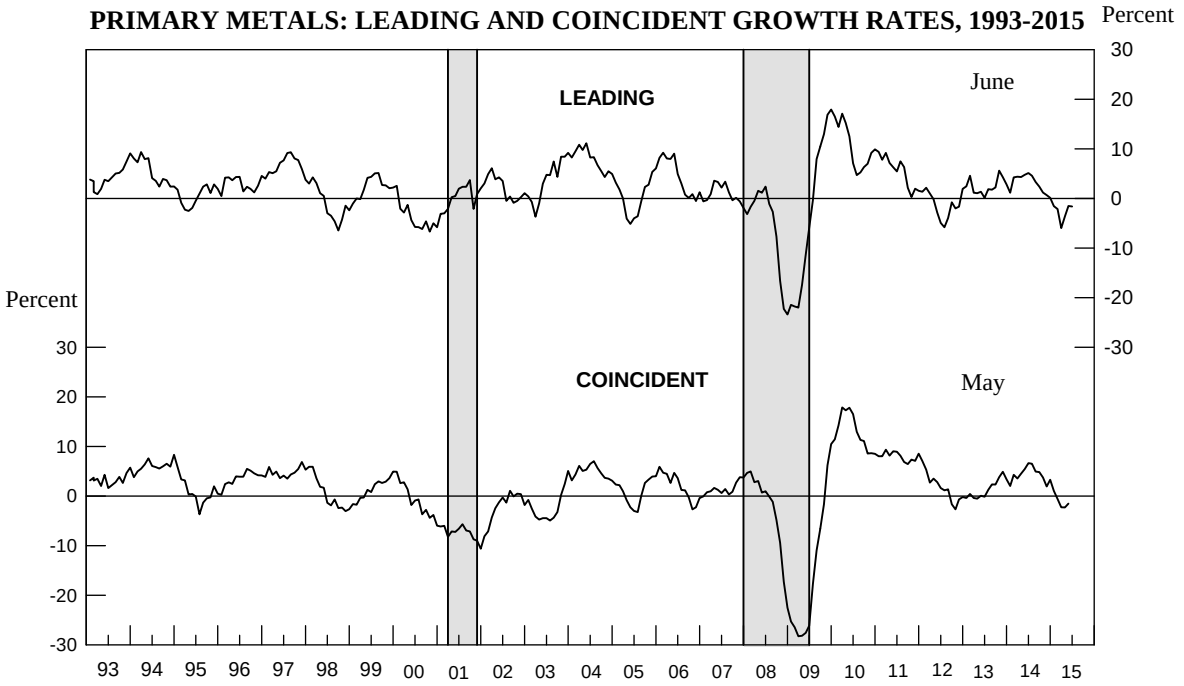
PRIMARY METALS: LEADING AND COINCIDENT INDEXES, 1993-2015



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



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.

U.S. Geological Survey, July 2015

Table 4.
The Steel Industry Indexes and Growth Rates

	Leading Index		Coincident Index	
	(1977 = 100)	Growth Rate	(1977 = 100)	Growth Rate
2014				
June	114.9	2.4	119.5	2.6
July	115.5	2.9	120.4	3.6
August	115.6	2.6	120.5	3.3
September	115.5	1.9	121.2	4.0
October	114.8	0.4	121.3	3.7
November	115.0	0.6	121.2	3.2
December	114.6	-0.2	121.4	3.2
2015				
January	114.0r	-1.2r	119.6	-0.1r
February	114.5	-0.5	119.4	-0.8
March	113.1	-2.9	118.8	-1.9
April	113.4	-2.1r	118.0r	-3.2r
May	114.1	-0.9	117.6	-3.7

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

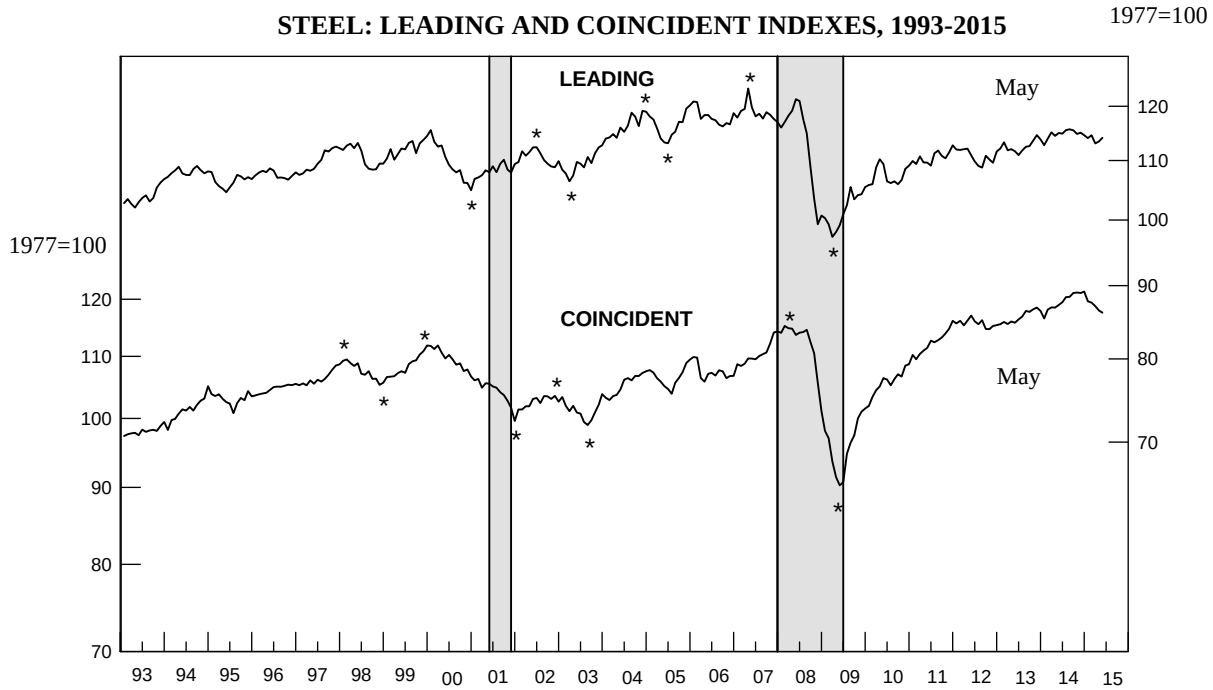
Leading Index	**April**	**May**
1. Average weekly hours, iron and steel mills (NAICS 3311 & 3312)	-0.4	-0.2
2. New orders, iron and steel mills (NAICS 3311 & 3312), 1982$	0.3	0.1
3. Shipments of household appliances, 1982$	0.0	0.0
4. S&P stock price index, steel companies	0.1	0.2
5. Retail sales of U.S. passenger cars and light trucks (units)	-0.2	0.3
6. Growth rate of the price of steel scrap (#1 heavy melting, $/ton)	0.1	0.1
7. Index of new private housing units authorized by permit	0.5	0.4
8. Growth rate of U.S. M2 money supply, 2009$	-0.1	-0.4
9. PMI	0.0	0.2
Trend adjustment	0.0	0.0
Percent change (except for rounding differences)	0.3	0.7
Coincident Index		
1. Industrial production index, iron and steel products (NAICS 3311 & 3312)	0.5r	0.0
2. Value of shipments, iron and steel mills (NAICS 3311 & 3312), 1982$	0.1	0.2
3. Total employee hours, iron and steel mills (NAICS 3311 & 3312)	-1.3r	-0.8
Trend adjustment	0.1	0.1
Percent change (except for rounding differences)	-0.6r	-0.5

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.

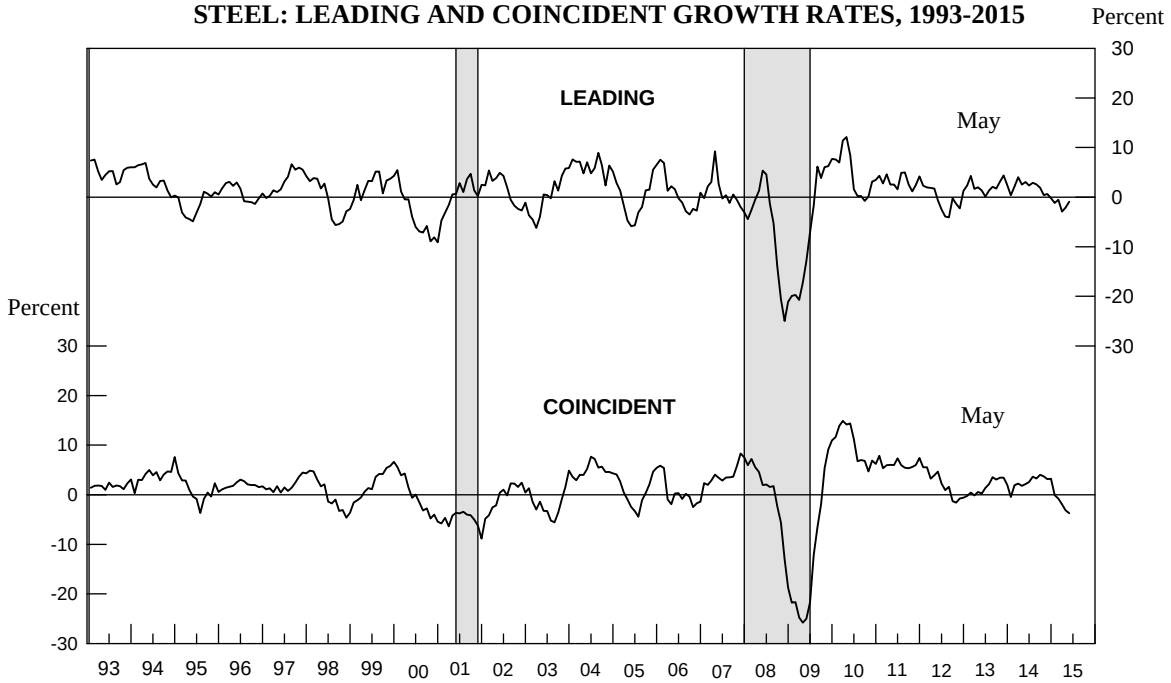
STEEL: LEADING AND COINCIDENT INDEXES, 1993-2015



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



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.

U.S. Geological Survey, July 2015

Table 6.
The Copper Industry Indexes and Growth Rates

	Leading Index		Coincident Index	
	(1977 = 100)	Growth Rate	(1977 = 100)	Growth Rate
2014				
June	128.9	4.1	114.3	8.8
July	127.3	1.1	113.2	5.8
August	127.4	0.9	112.8	4.3
September	127.7	1.0	109.6	-1.5
October	128.1	1.4	108.4	-3.7
November	129.0	2.4	107.8	-4.6
December	128.8	1.8	111.6r	1.7r
2015				
January	126.3r	-2.0r	110.1	-1.0r
February	129.2	2.1	111.3	0.7
March	128.7	1.1	111.5r	0.7r
April	128.4r	0.7r	111.2r	0.3
May	129.8	2.6	111.9	1.3

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

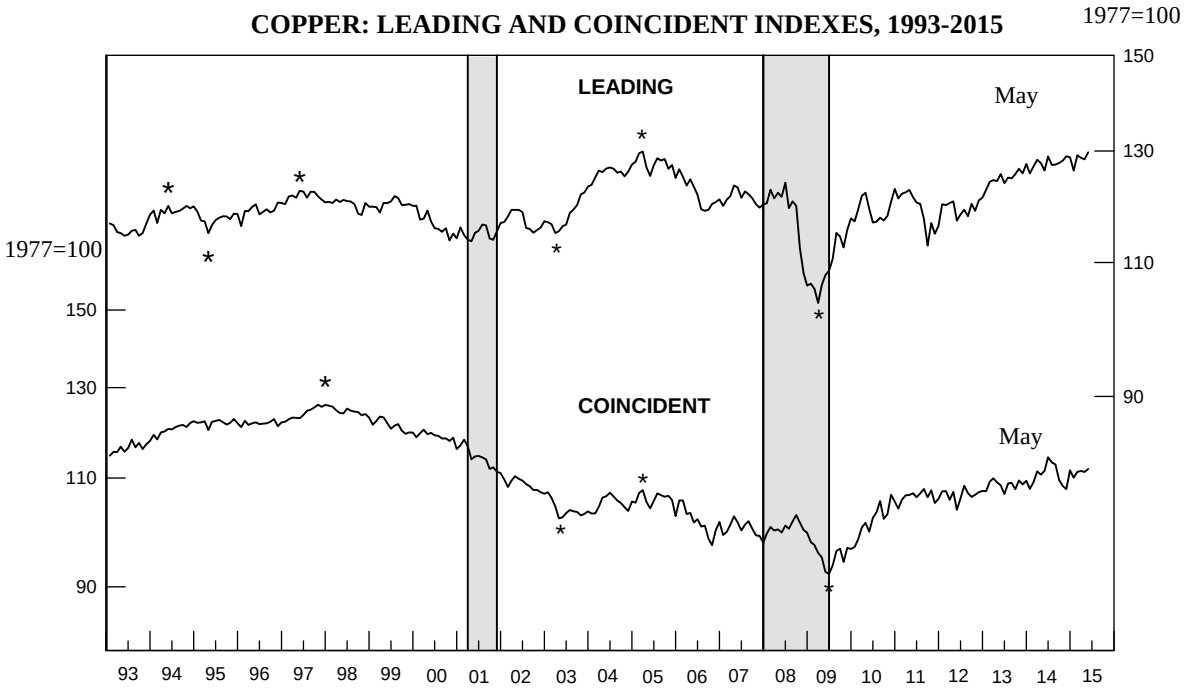
Leading Index	**April**	**May**
1. Average weekly hours, nonferrous metals (except aluminum) (NAICS 3314)	-0.6	0.3
2. New orders, nonferrous metal products, (NAICS 3313, 3314, & 335929) 1982$	-0.3	-0.1
3. S&P stock price index, building products companies	0.1	0.2
4. LME spot price of primary copper	0.2	-0.1
5. Index of new private housing units authorized by permit	0.6	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)	-0.1	1.1
Coincident Index		
1. Industrial production index, primary smelting and refining of copper (NAICS 331411)	0.0	0.0
2. Total employee hours, nonferrous metals (except aluminum) (NAICS 3314)	-0.3r	0.5
3. Copper refiners' shipments (short tons)	NA	NA
Trend adjustment	0.1	0.1
Percent change (except for rounding differences)	-0.2r	0.6

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.

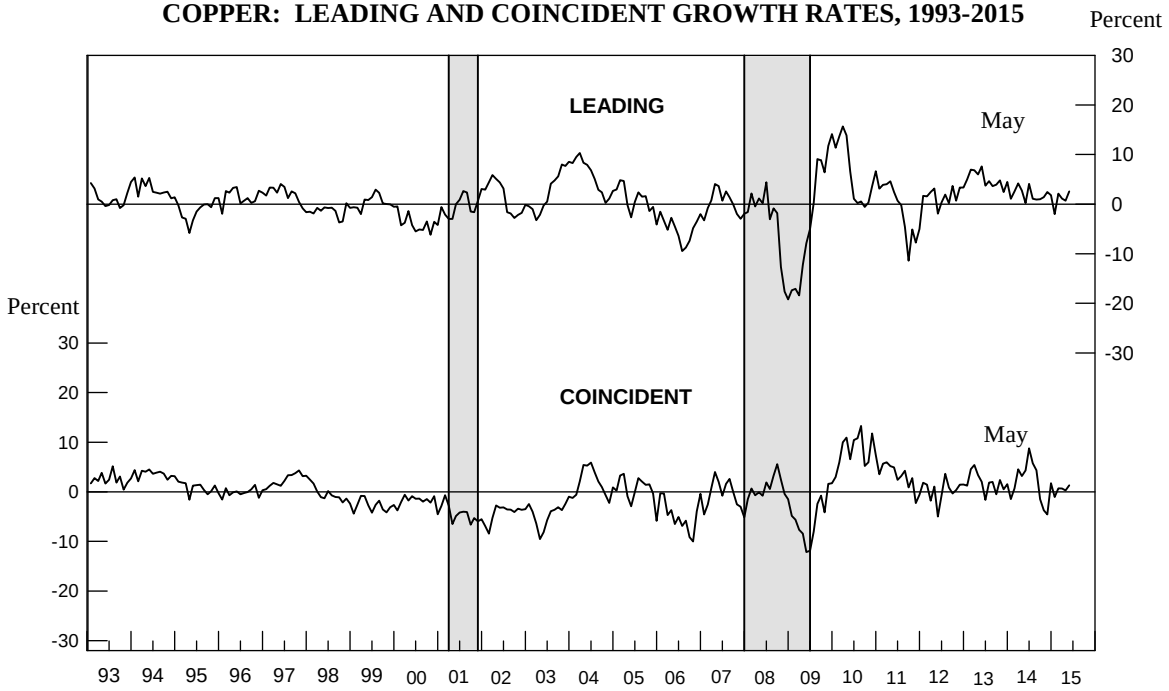
COPPER: LEADING AND COINCIDENT INDEXES, 1993-2015



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



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.

U.S. Geological Survey, July 2015

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:

$$\left(\left(\frac{\textit{current value}}{\begin{array}{c}\textit{preceding 12-month}\\ \textit{moving average}\end{array}}\right)^{\frac{12}{6.5}} - 1\right) * 100$$

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, August 21. 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:

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988 National Center
Reston, Virginia 20192