Metal Industry Indicators

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

January 2014

The primary metals leading index increased sharply in December, and its 6-month smoothed growth rate rebounded after a dip in November. The U.S. manufacturing sector increased moderately in 2013 and increased its metals demand. The automotive industry, in particular, accelerated robustly. The construction sector also raised its metals consumption in 2013, despite residential construction activity waning in the latter part of the year. Stronger economic growth in most industrialized countries could stimulate demand for U.S. metals and metal products. The metals price leading index decreased in November, as did its growth rate. However, the declining global inventories could prevent any major metals price declines.

The **primary metals leading index** increased 1.1% to 166.6 in December from a revised 164.8 in November. The index's 6-month smoothed growth rate, a compound annual rate that measures the near-term trend, increased to 6.0% from a downwardly revised 4.5% in November. A growth rate above +1.0% is usually a sign of an upward near-term trend for future metals activity, while 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 increased in December. The steadily rising stock price index combining construction and farm machinery companies and industrial machinery companies reached a new record level. It contributed 0.5 percentage point to the net increase in the primary metals leading index. The average workweek in primary metals establishments, which has generally been increasing over the last 2 years, was slightly longer in December. It contributed 0.4 percentage point. The USGS metals price index growth rate contributed 0.2 percentage point. In contrast, the PMI, the Institute for Supply Management's purchasing managers' index, slipped slightly in December. It contributed -0.1 percentage point, but still points to further expansion in future U.S. 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 has increased 5 of the last 6 months and indicates further metals industry activity growth in the near term. Growth in the U.S. economy gained traction in 2013. However, fewer new jobs created and a decline in new orders for durable goods in December ended the year with a less optimistic outlook. Nevertheless, the manufacturing sector will boost its metals consumption in response to pent-up demand for automotive equipment. Housing construction may decline in the immediate future, as suggested by the decrease in new building permits issued and housing starts in recent months. Nonresidential construction activity increased in 2013 and is boosting domestic metal demand. Stronger industrialized-country economic growth could increase demand for some U.S. metals and metal products.

The **steel leading index** increased 0.5% to 115.1 in November, the latest month for which it is available, from a revised 114.5 in October. Its 6-month smoothed growth rate increased to 5.3% from a revised 4.9%. Most of its indicators moved higher, but sizable gains in the S&P stock price index for steel companies and car and light truck sales made the largest positive contributions. A sharp pullback in the inflation-adjusted M2 money supply growth rate offset much of those gains. The positive steel leading index growth rate suggests that activity in the steel industry could increase in the near term. However, the U.S. steel industry faces competition from low-priced steel imports.

The **copper leading index** decreased 0.8% in November to 131.1 from a revised 132.1 in October. Its 6-month smoothed growth rate decreased to 4.5% from a revised 7.2% in October. A nearly 1-hour shorter average workweek in nonferrous metals (except aluminum) plants held the copper leading index back the most in November. In contrast, the only sizable positive contribution to the leading index was from the S&P stock price index for building products companies. The leading index growth rate suggests an increase in U.S. copper industry activity could take place in the near term. Declining global copper inventories normally promote copper industry activity; however, decreased manufacturing growth in emerging economies could slow copper industry activity.

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Metals Price Leading Index Declines

The **metals price leading index** decreased 0.5% to 110.2 in November, the latest month for which it is available, from a revised 110.7 in October. Its 6-month smoothed growth rate also decreased, falling to 2.9% in November from a revised 4.2%. The growth rate of the trade-weighted average exchange value of other major currencies against the U.S. dollar fell and contributed -0.3 percentage point to the net decline in the metals price leading index. A slowdown in the growth rate of the inflation-adjusted value of new orders for U.S. nonferrous metal products also contributed 0.3 percentage points in November. In contrast, a wider yield spread between the U.S. 10-year Treasury note and the federal funds rate contributed 0.1 percentage point. A slight increase in the Organization for Economic Cooperation and Development (OECD) Total Leading Index growth rate, which has generally been rising over the last 2 years, is still signaling an increase in growth in major industrialized countries. It contributed another 0.1 percentage point. The metals price leading index 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, decreased for a second consecutive month in November. Moreover, global LME inventories continue to decrease, particularly copper inventories.

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, speculation, and production costs.

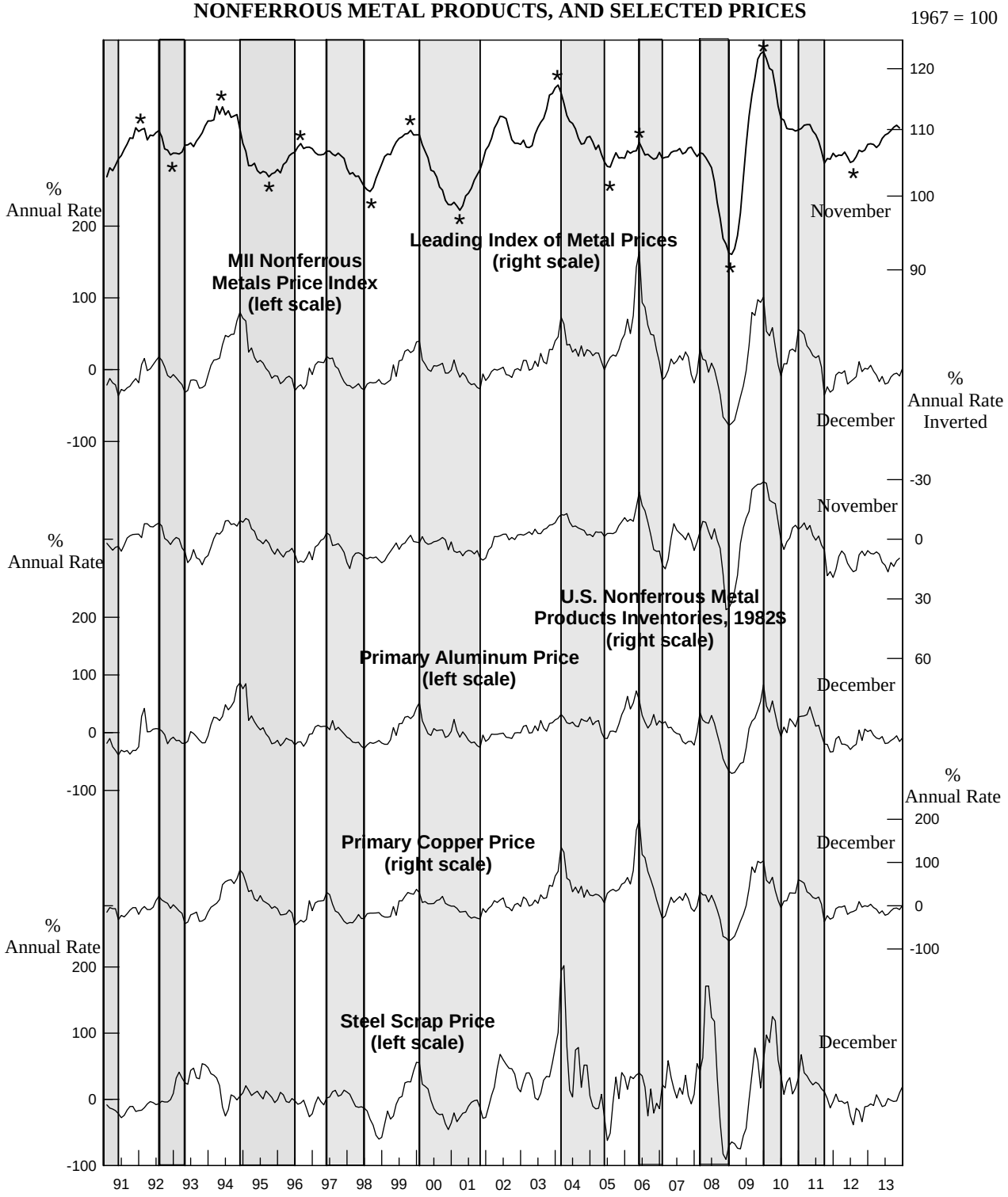
Table 1.
Leading Index of Metal Prices and Growth Rates of the Nonferrous Metals Price Index, Inventories of Nonferrous Metal Products, and Selected Metal Prices

		Six-Month Smoothed Growth Rates				
	Leading Index of Metal Prices (1967=100)	MII Nonferrous Metals Price Index	U.S. Nonferrous Metal Products Inventories (1982$)	Primary Aluminum	Primary Copper	Steel Scrap
2012						
November	106.8r	1.8	8.2	6.1	0.0	-11.2
December	107.7r	0.7	5.8	1.7	-1.9	-10.4
2013						
January	107.8r	6.0	7.1	4.2	3.3	-6.8
February	107.7r	-2.1	7.4	-4.7	-4.0	-9.4
March	107.2r	-7.7	6.3	-9.3	-8.1	7.0
April	107.6r	-16.8	7.5	-10.9	-17.7	-1.4
May	108.6r	-9.7	11.6	-6.8	-11.6	-11.0
June	109.1r	-20.2	13.1	-19.0	-21.9	-9.4
July	109.4	-18.5	16.4r	-18.2	-19.4	1.3
August	109.8	-10.3	11.7r	-13.5	-11.5	-1.5
September	110.4r	-6.5	13.7	-10.5	-6.0	-3.1
October	110.7r	-4.8	10.8r	-5.5	-5.5	-2.5
November	110.2	-8.9	9.5	-15.5	-8.8	9.7
December	NA	2.0	NA	-8.9	1.5	19.6

NA: Not available **r:** Revised

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.
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.

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, January 2014

Table 2.
The Primary Metals Industry Indexes and Growth Rates

	Leading Index		Coincident Index	
	(1977 = 100)	Growth Rate	(1977 = 100)	Growth Rate
2012				
December	161.1	2.4	111.2	1.1
2013				
January	161.5	2.9	110.9	0.5
February	162.6	4.1	110.9	0.4
March	159.0	-0.2	109.9	-1.2
April	159.8	0.9	109.7	-1.6
May	159.6	0.7	110.2	-0.7
June	157.8	-1.5	109.9	-1.2
July	160.9	2.0	111.3	1.3r
August	161.5	2.1r	111.8	2.1r
September	162.4r	2.7r	112.1	2.7r
October	166.1r	6.7r	113.4r	4.5r
November	164.8r	4.5r	113.9	4.8
December	166.6	6.0	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)	0.0	0.4
2. Weighted S&P stock price index, machinery, construction and farm and industrial (December 30, 1994=100)	0.1r	0.5
3. Ratio of price to unit labor cost (NAICS 331)	-0.3	NA
4. USGS metals price index growth rate	0.0	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	-0.1	NA
7. Growth rate of U.S. M2 money supply, 2005$	-0.7	NA
8. PMI	0.1r	-0.1
Trend adjustment	0.0	0.0
Percent change (except for rounding differences)	-0.9r	1.0

Coincident Index	**October**	**November**
1. Industrial production index, primary metals (NAICS 331)	0.5r	0.0
2. Total employee hours, primary metals (NAICS 331)	0.2	0.2
3. Value of shipments, primary metals products, (NAICS 331 & 335929) 1982$	0.2	0.1
Trend adjustment	0.1	0.1
Percent change (except for rounding differences)	1.0r	0.4

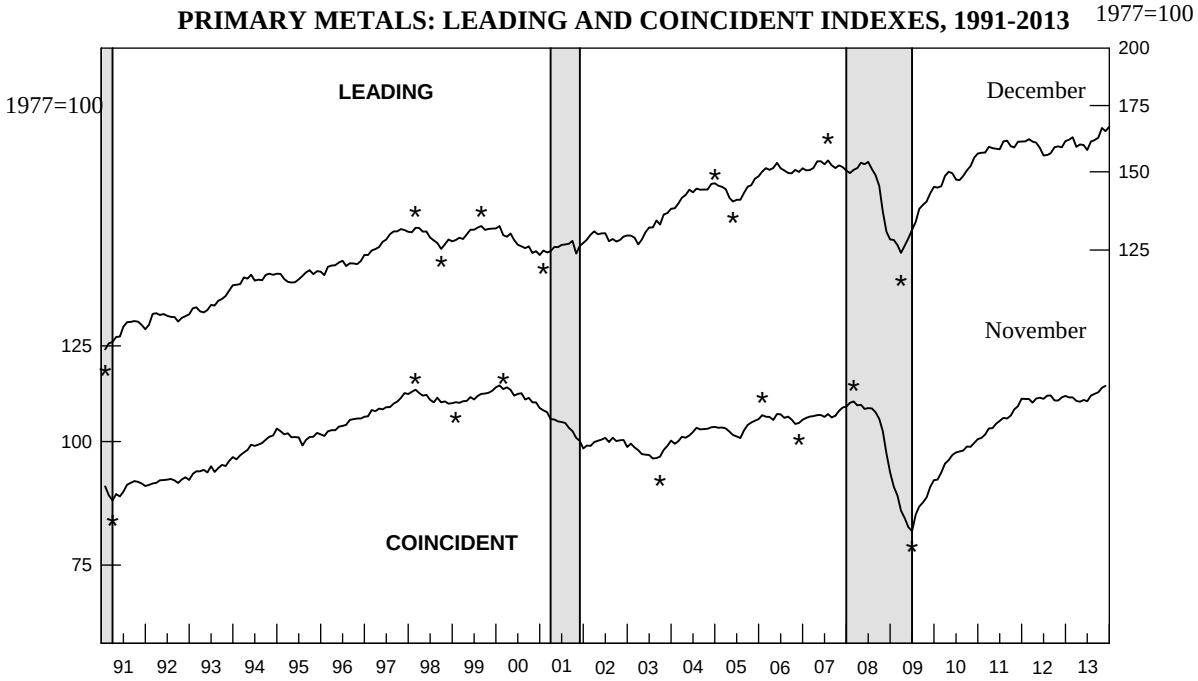
Sources: Leading: 1, Bureau of Labor Statistics; 2, Standard & Poor's and U.S. Geological Survey; 3, U.S. Geological Survey; 4, Journal of Commerce and U.S. Geological Survey; 5, U.S. Census Bureau and U.S. Geological Survey; 6, U.S. Census Bureau and U.S. Geological Survey; 7, Federal Reserve Board,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

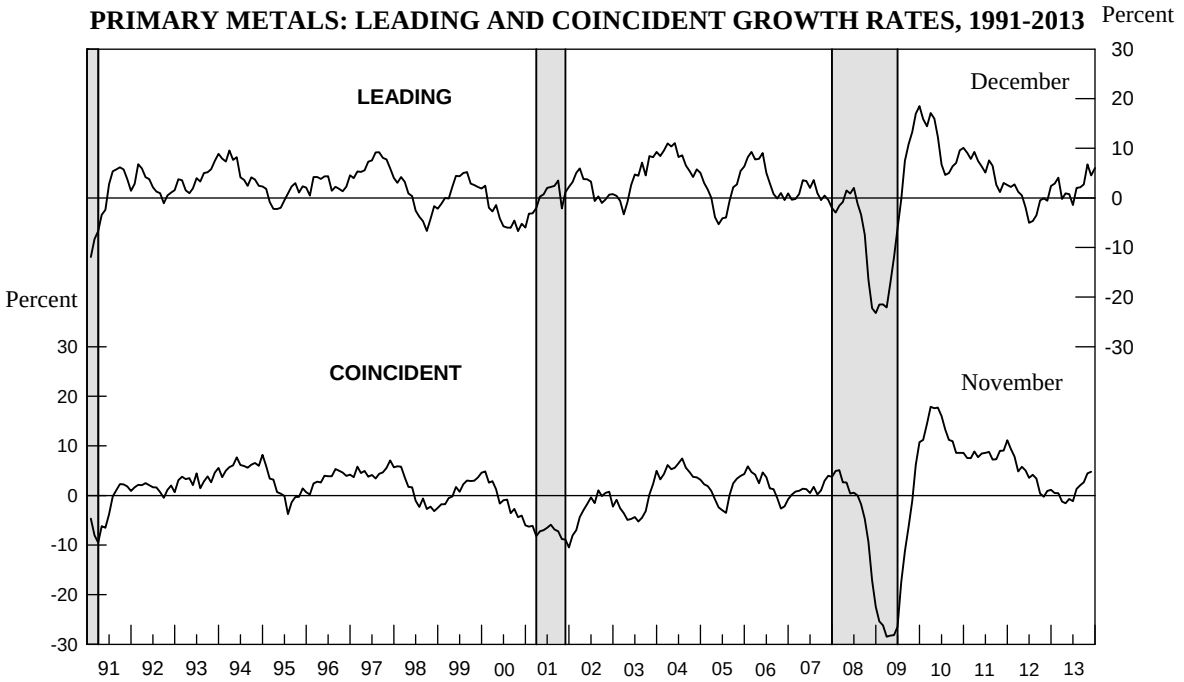
PRIMARY METALS: LEADING AND COINCIDENT INDEXES, 1991-2013



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, 1991-2013



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, January 2014

Table 4.
The Steel Industry Indexes and Growth Rates

	Leading Index		Coincident Index	
	(1977 = 100)	Growth Rate	(1977 = 100)	Growth Rate
2012				
December	111.3	1.2	116.1	-0.1
2013				
January	111.9	2.3	116.4	0.4
February	112.6	3.5	116.5	0.6
March	111.0	0.7r	116.0	-0.2
April	111.8	2.0	116.1	-0.1
May	111.2	1.1	115.5	-1.1
June	110.4	-0.4	116.4	0.5
July	112.1	2.3	117.5	2.2
August	112.8	3.0	118.1	3.1
September	113.0	2.7	118.0	2.7
October	114.5r	4.9r	119.0r	4.0r
November	115.1	5.3	119.2	3.8

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.

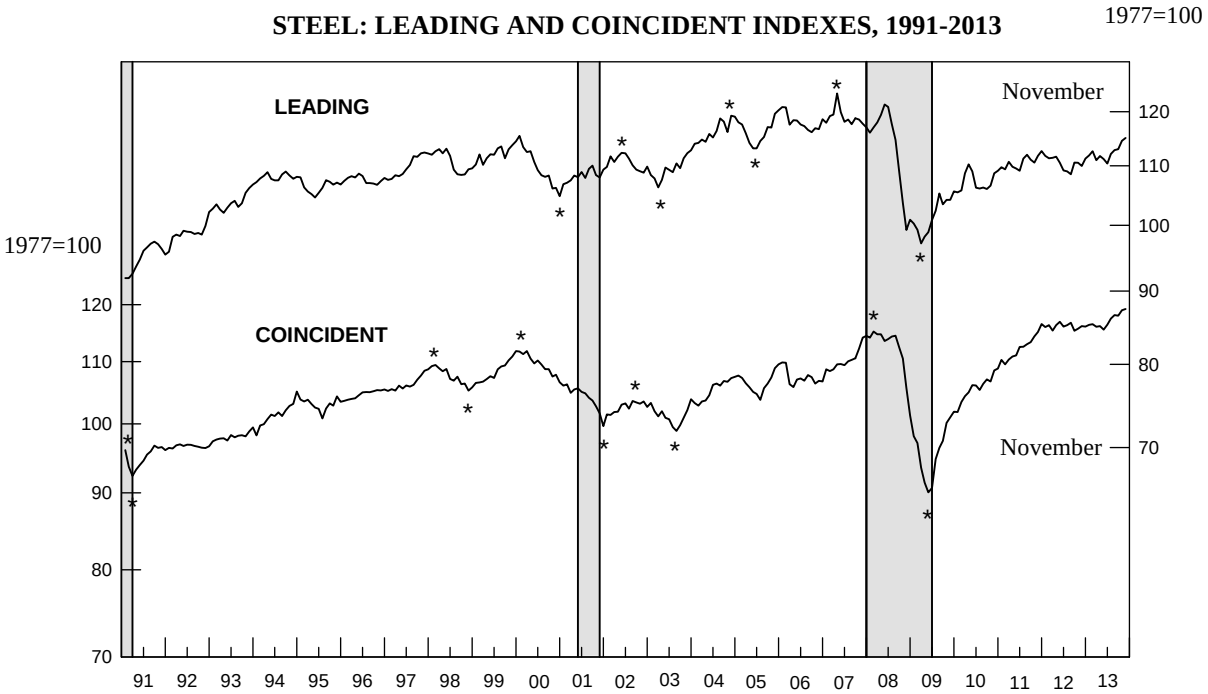
Table 5.
The Contribution of Each Steel Index Component to the Percent Change in the Index from the Previous Month

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$	0.2r	-0.1
3. Shipments of household appliances, 1982$	0.1	0.2
4. S&P stock price index, steel companies	0.2	0.4
5. Retail sales of U.S. passenger cars and light trucks (units)	0.0	0.3
6. Growth rate of the price of steel scrap (#1 heavy melting, $/ton)	-0.1	0.2
7. Index of new private housing units authorized by permit	0.3	-0.1
8. Growth rate of U.S. M2 money supply, 2005$	0.8	-0.7
9. PMI	0.0	0.1
Trend adjustment	0.0	0.0
Percent change (except for rounding differences)	1.2r	0.4
Coincident Index		
1. Industrial production index, iron and steel products (NAICS 3311 & 3312)	0.7r	0.0
2. Value of shipments, iron and steel mills (NAICS 3311 & 3312), 1982$	0.5r	-0.1
3. Total employee hours, iron and steel mills (NAICS 3311 & 3312)	-0.5	0.1
Trend adjustment	0.1	0.1
Percent change (except for rounding differences)	0.8r	0.1

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; 3, Bureau of Labor Statistics and U.S. Geological Survey. All series are seasonally adjusted, except 4 and 6 of the leading index.

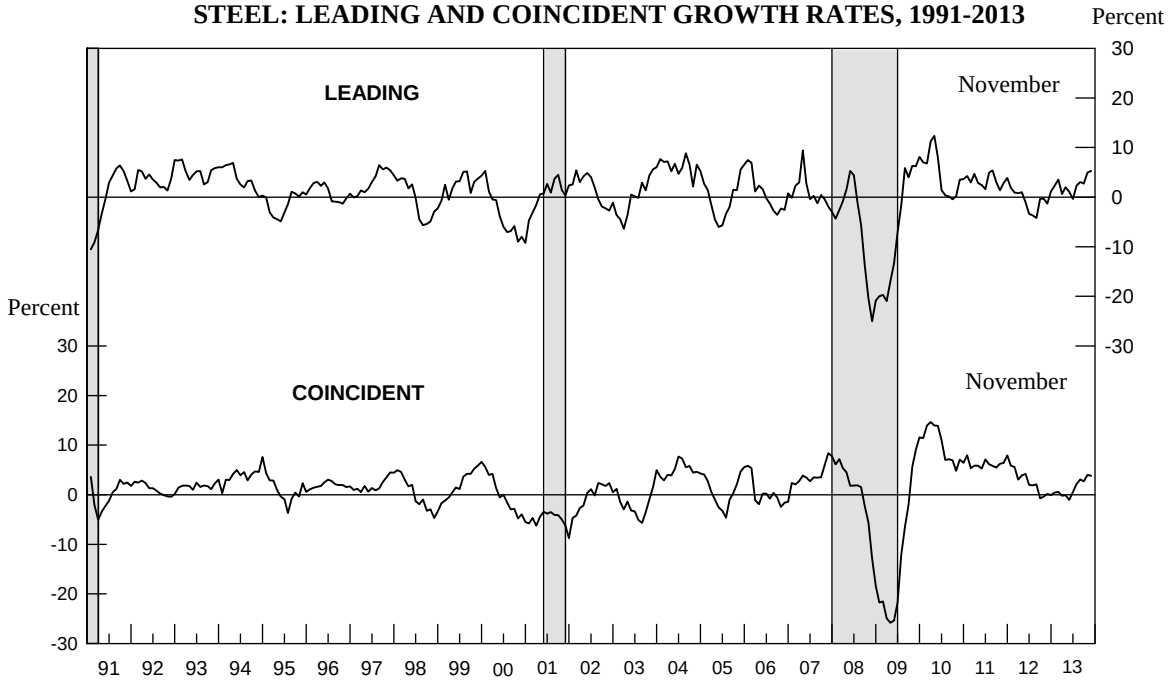
r: Revised

CHART 4.
STEEL: LEADING AND COINCIDENT INDEXES, 1991-2013



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, 1991-2013



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, January 2014

Table 6.
The Copper Industry Indexes and Growth Rates

	Leading Index		Coincident Index	
	(1977 = 100)	Growth Rate	(1977 = 100)	Growth Rate
2012				
December	126.1	6.8	108.1	-0.3
2013				
January	124.2	2.9	104.3	-6.5
February	128.6	9.3	108.2	0.8
March	127.2	6.2	106.0	-2.7
April	126.8	4.9	105.1	-4.0
May	129.8	8.9	107.2	0.2
June	127.3	3.7	104.1	-5.2
July	129.7	6.6	107.7	1.4
August	129.6	5.5	108.3	2.9
September	131.2	6.8	107.8r	2.0r
October	132.1r	7.2r	107.9r	2.0r
November	131.1	4.5	105.7	-1.8

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

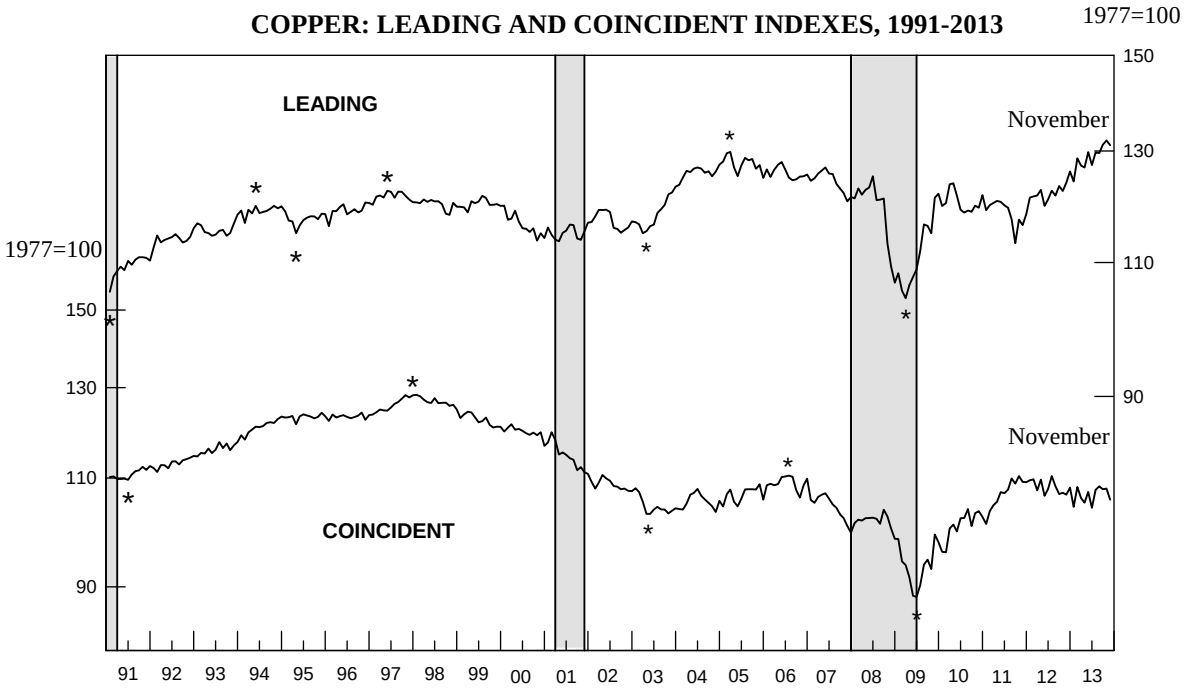
Leading Index	**October**	**November**
1. Average weekly hours, nonferrous metals (except aluminum) (NAICS 3314)	0.7	-0.7
2. New orders, nonferrous metal products, (NAICS 3313, 3314, & 335929) 1982$	0.0r	-0.1
3. S&P stock price index, building products companies	-0.2	0.2
4. LME spot price of primary copper	0.0	-0.1
5. Index of new private housing units authorized by permit	0.4	-0.1
6. Spread between the U.S. 10-year Treasury Note and the federal funds rate	-0.2	0.1
Trend adjustment	0.0	0.0
Percent change (except for rounding differences)	0.7r	-0.7
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)	0.3	-1.8
3. Copper refiners' shipments (short tons)	NA	NA
Trend adjustment	0.1	0.1
Percent change (except for rounding differences)	0.1	-2.0

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; 6, Federal Reserve Board and U.S. Geological Survey. Coincident: 1, Federal Reserve Board; 2, Bureau of Labor Statistics; 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.

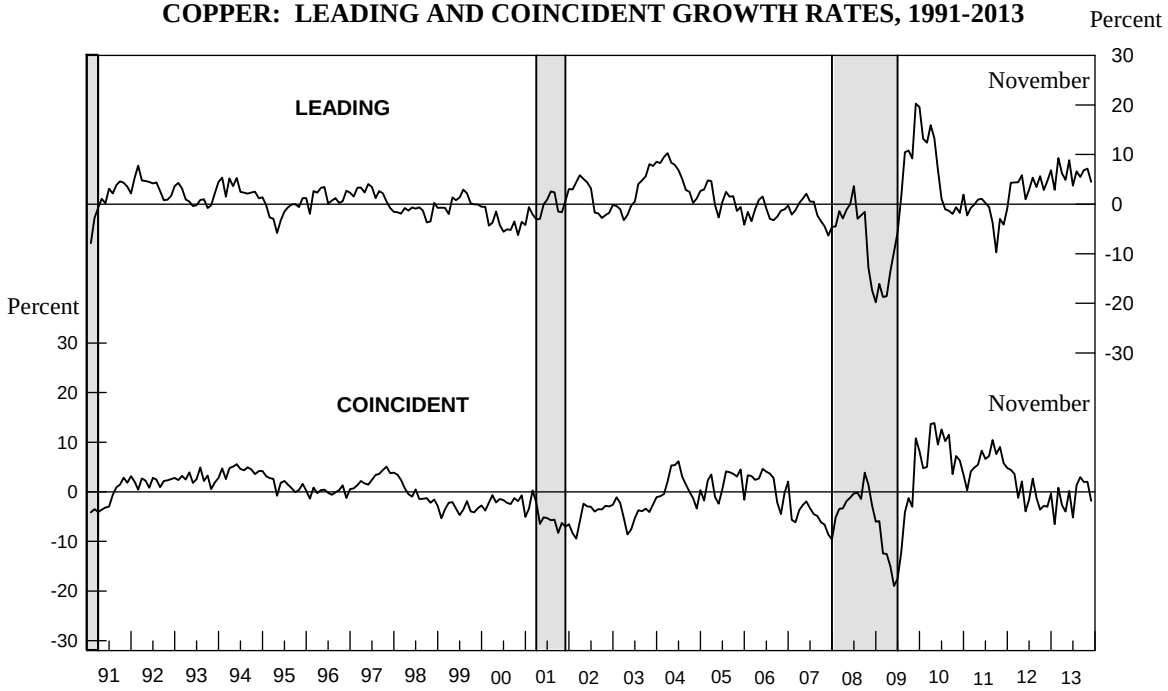
COPPER: LEADING AND COINCIDENT INDEXES, 1991-2013



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, 1991-2013



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, January 2014

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. EST, Friday, February 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) and Ken Beckman (703-648-4916; e-mail: kbeckman@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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Reston, Virginia 20192