

Metal Industry Indicators

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

August 2014

The primary metals leading index increased in July, and its 6-month smoothed growth rate rose slightly. U.S. manufacturing activity is accelerating and underpinning the metals industry recovery. U.S. durable goods new orders increased to a record high level in July, led by a sharp increase in orders for transportation equipment, particularly airplanes. The construction sector is advancing the metals industry recovery also, but not as robustly as manufacturing. Although home sales remain weak, nonresidential construction spending is improving, raising this sector's metals consumption. Slow economic growth in most other industrialized countries, as well as emerging economies, has limited demand for U. S metal products. The metals price leading index growth rate has steadily decreased since the start of the year, suggesting decreases in some metal prices. U.S. metals inventory levels continued to climb, and the decline in some LME metal inventories slowed.

The **primary metals leading index** increased 0.4% to 167.9 in July from a revised 167.2 in June. The index's 6-month smoothed growth rate, a compound annual rate that measures the near-term trend, increased to 3.8% from a downwardly revised 3.7% in June. 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 increased in July. The PMI, the Institute for Supply Management's purchasing managers' index, increased sharply and made the largest positive contribution, 0.4 percentage point, to the net increase in the primary metals leading index. The rise in the USGS metals price index growth rate contributed 0.3 percentage point. In contrast, a shorter average workweek in primary metals establishments contributed -0.2 percentage point. The first decrease in the stock price index combining construction and farm machinery companies and industrial machinery companies in over a year contributed -0.1 percentage. 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 metals industry activity is likely to continue to grow in the near future. Increased manufacturing activity is raising metals demand. Increased new orders for durable goods, particularly transportation equipment, is increasing metals consumption. The increased demand for airplanes will likely raise metals demand in the long-term, however; steadily increasing new orders for cars

and trucks are promoting metals industry activity in the short term. Sales of new single-family homes are slowing and the supply of available homes continued to rise. The sales-to-inventory ratio reached the balanced 6-month level for the first time in 4 years. Although permits for single-family homes have been slow to recover from recession levels, permits for apartment units have continuously increased. Apartment units permits rose nearly 24% in July. Slow global economic growth is limiting U.S. metal products exports.

The **steel leading index** decreased 0.4% to 114.4 in June from a revised 114.9 in May. Its 6-month smoothed growth rate decreased to 1.5% from a revised 2.8% in May. Six of its nine indicators decreased. Fewer average weekly hours worked in iron and steel plants, a drop in the inflation-adjusted M2 money supply growth rate, and a dip in the index for new building permits made the largest negative contributions to the steel leading index. In contrast, new orders for iron and steel products increased and the largest shipments of household appliances since the start of the last recession offset some of those declines. Although the accelerating domestic manufacturing sector is increasing its steel consumption, growth in the U.S. steel industry is being undermined by low-priced steel imports. Steel imports increased more than 6% in July; moreover, total year-to-date steel imports are 37% higher than in 2013.

The **copper leading index** increased 1.7% in June to 131.2 from a revised 129.0 in May. Its 6-month smoothed growth rate increased to 3.3% from a revised 0.1% in May. Four of its six indicators increased. A nearly one and one-half hour longer average workweek in nonferrous (except aluminum) metals

plants made the largest positive contribution to the copper leading index. An uptick in the S&P stock price index for building products companies also posted a large contribution. In contrast, the index for new housing permits made a significant negative contribution in June. Although the leading index growth rate moved higher in June, the ample U.S. copper inventory will likely supply the domestic copper requirement in the near term.

Decline in LME Metal Inventories Slowed

The **metals price leading index** decreased 0.2% to 108.3 in June from a revised 108.5 in May. Its 6-month smoothed growth rate decreased to -1.9% in June from a revised -1.4% in May. The falling Organization for Economic Cooperation and Development (OECD) Total Leading Index growth rate stands at its lowest rate since January 2013. It contributed -0.2 percentage point to the net decline in the metals price leading index. The negative trade-weighted average exchange value of other major currencies against the U.S. dollar growth rate contributed -0.1 percentage point. The growth rate of the inflation-adjusted value of new orders for U.S. nonferrous metal products has been essentially flat over the last 3 months, thus its contribution rounded to zero.

Similarly, the contribution from a slightly wider yield spread between the U.S. 10-year Treasury Note and the federal funds rate also rounded to zero. 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 June. However, levels of these inventories rose to a more than 5-year high. Global LME inventories edged up recently, with the exception of aluminum. Aluminum prices are expected to soar in response to increased transportation equipment orders, especially aerospace equipment and more aluminum-built trucks.

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
2013						
June	109.1	-20.2	13.4	-19.0	-21.9	-9.4
July	109.2	-18.5	16.7	-18.2	-19.4	1.3
August	109.7	-10.3	11.3	-13.5	-11.5	-1.5
September	110.1	-6.5	14.2	-10.5	-6.0	-3.1
October	110.4	-4.8	11.1	-5.5	-5.5	-2.5
November	109.8r	-8.9	10.0	-15.5	-8.8	9.7
December	110.2r	2.0	11.2	-8.9	1.5	19.6
2014						
January	109.1	-4.9	9.3	-16.4	-5.0	29.8
February	108.7r	-1.9	8.7r	-7.6	-2.7	13.1
March	108.8	-11.3	6.7r	-5.0	-12.7	4.9
April	108.8r	-7.1	10.0	0.3	-8.7	12.1
May	108.5r	-0.7	8.6r	6.7	-1.0	4.7
June	108.3	-0.1	7.9	10.2	-1.5	-0.4
July	NA	5.7	NA	27.8	2.8	-1.9

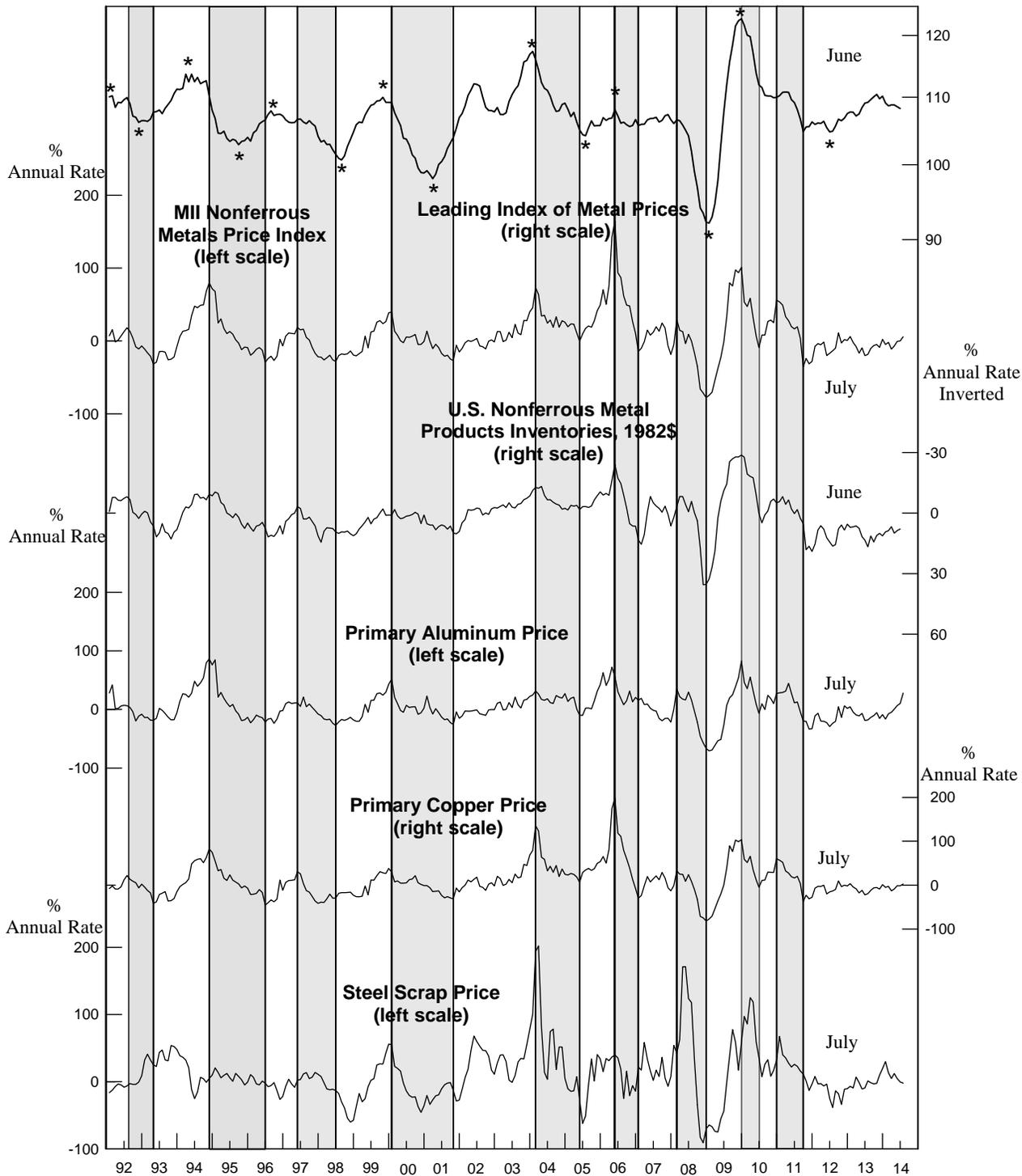
NA: Not available r: Revised

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**

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
2013				
July	161.2r	2.0r	111.6	1.4
August	161.7r	2.1	112.2	2.3
September	162.7r	2.7	112.7	3.1
October	165.8	6.0r	113.5	4.1
November	164.8	4.0r	114.2	4.7
December	164.0	2.5r	114.0	3.9
2014				
January	162.3	0.2	113.3	2.4
February	165.5	3.8r	114.3	3.8r
March	165.2	3.3r	114.3r	3.3r
April	166.7r	4.4r	115.1r	4.1r
May	167.4r	4.6r	115.8r	4.6r
June	167.2r	3.7r	116.4	4.8
July	167.9	3.8	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			June	July
1. Average weekly hours, primary metals (NAICS 331)			-0.2	-0.2
2. Weighted S&P stock price index, machinery, construction and farm and industrial (December 30, 1994=100)			0.2r	-0.1
3. Ratio of price to unit labor cost (NAICS 331)			0.2	NA
4. USGS metals price index growth rate			0.0r	0.3
5. New orders, primary metal products, (NAICS 331 & 335929) 1982\$			0.0	NA
6. Index of new private housing units authorized by permit			-0.2	NA
7. Growth rate of U.S. M2 money supply, 2005\$			-0.2	NA
8. PMI			0.0	0.4
Trend adjustment			0.0	0.0
			-0.2r	0.4
Coincident Index			May	June
1. Industrial production index, primary metals (NAICS 331)			0.0	0.2
2. Total employee hours, primary metals (NAICS 331)			0.4	0.1
3. Value of shipments, primary metals products, (NAICS 331 & 335929) 1982\$			0.1	0.1
Trend adjustment			0.1	0.1
			0.6	0.5

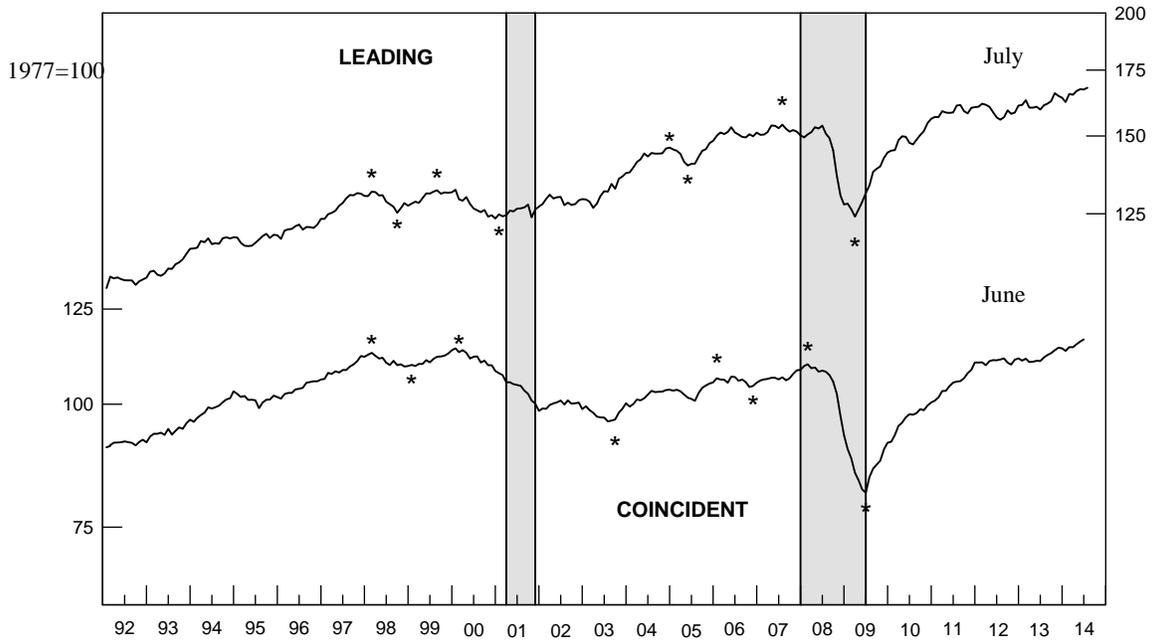
Sources: Leading: 1, Bureau of Labor Statistics; 2, Standard & Poor's and U.S. Geological Survey; 3, U.S. Geological Survey; 4, Journal of Commerce and U.S. Geological Survey; 5, U.S. Census Bureau and U.S. Geological Survey; 6, U.S. Census Bureau and U.S. Geological Survey; 7, Federal Reserve Board,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

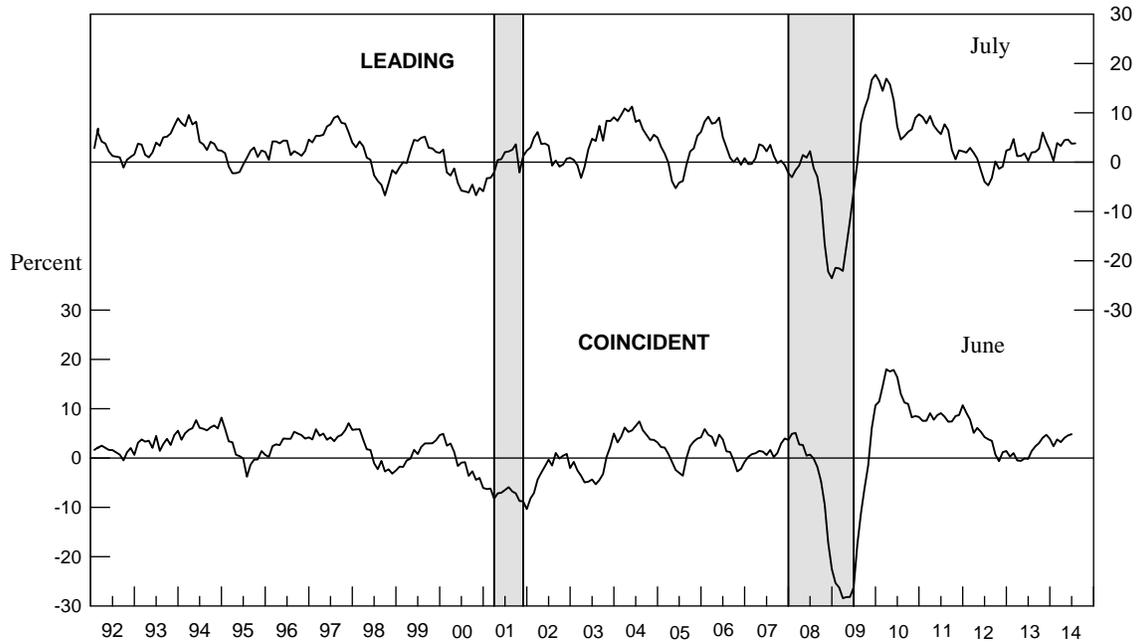
PRIMARY METALS: LEADING AND COINCIDENT INDEXES, 1992-2014 1977=100



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, 1992-2014 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>
2013				
July	112.0r	2.0r	116.2	1.4
August	112.7r	2.7r	117.2	2.9
September	112.9	2.5r	117.1	2.7
October	113.9	3.9r	117.7	3.3
November	114.8r	4.8	117.9	3.3
December	113.9r	2.4r	117.2	1.8
2014				
January	112.4r	-0.4r	115.6	-1.0r
February	113.8r	1.9r	116.9	1.1r
March	114.3r	2.6r	117.2r	1.4r
April	114.5r	2.6r	117.3	1.2
May	114.9r	2.8r	117.6r	1.4r
June	114.4	1.5	117.8	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 5.
The Contribution of Each Steel Index Component to the Percent Change
in the Index from the Previous Month**

Leading Index	May	June
1. Average weekly hours, iron and steel mills (NAICS 3311 & 3312)	0.0	-0.2
2. New orders, iron and steel mills (NAICS 3311 & 3312), 1982\$	0.2	0.1
3. Shipments of household appliances, 1982\$	0.1	0.2
4. S&P stock price index, steel companies	0.0	-0.1
5. Retail sales of U.S. passenger cars and light trucks (units)	0.2	0.0
6. Growth rate of the price of steel scrap (#1 heavy melting, \$/ton)	0.0	-0.1
7. Index of new private housing units authorized by permit	-0.3	-0.2
8. Growth rate of U.S. M2 money supply, 2005\$	0.0	-0.2
9. PMI	0.1	0.0
Trend adjustment	0.0	0.0
Percent change (except for rounding differences)	0.3	-0.5
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\$	0.2r	0.3
3. Total employee hours, iron and steel mills (NAICS 3311 & 3312)	-0.1	-0.2
Trend adjustment	0.1	0.1
Percent change (except for rounding differences)	0.3r	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, 1992-2014

1977=100

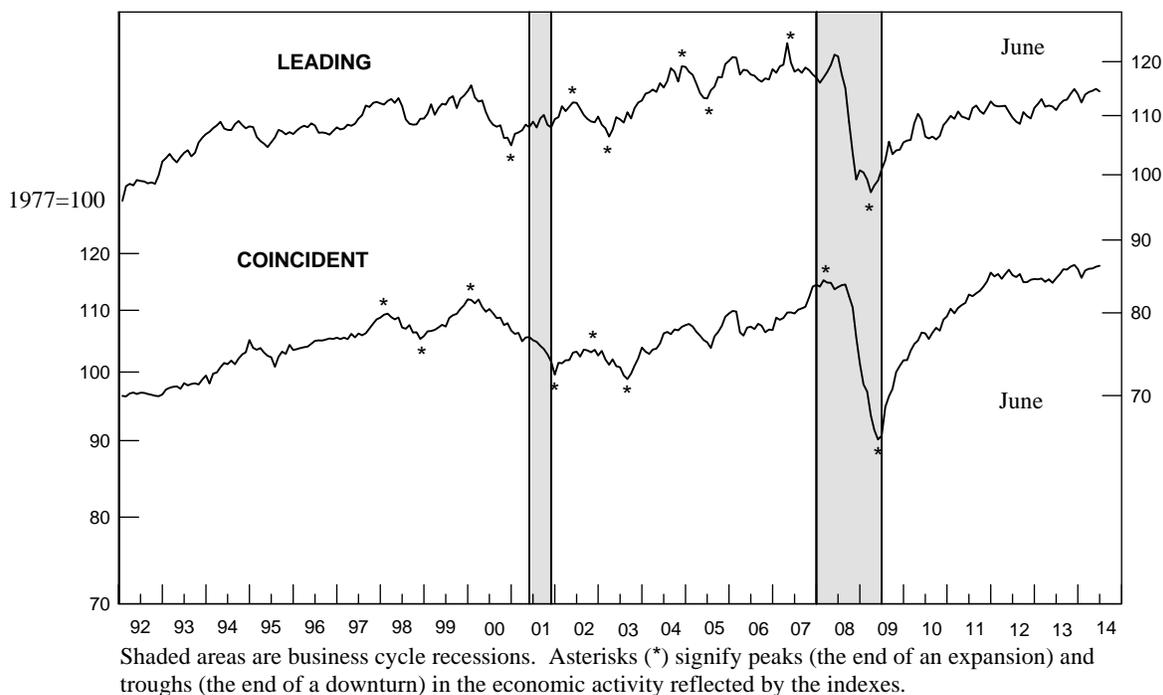
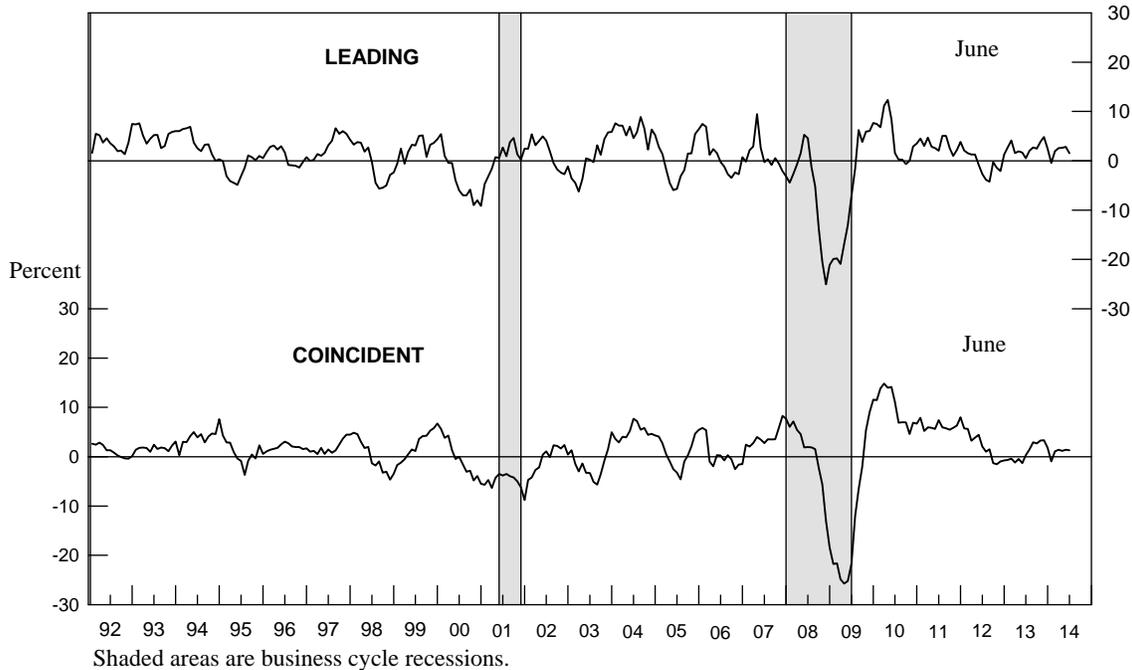


CHART 5.
STEEL: LEADING AND COINCIDENT GROWTH RATES, 1992-2014

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**

	Leading Index		Coincident Index	
	(1977 = 100)	Growth Rate	(1977 = 100)	Growth Rate
2013				
July	127.9	5.1	108.2	0.8
August	127.8	4.1	108.1	0.7
September	128.4	4.0	106.6	-2.0
October	129.8	5.4	108.3	0.7
November	128.6	2.6	107.2	-1.3
December	130.5	4.6	107.8	-0.3
2014				
January	128.1	0.3	106.0	-3.4
February	129.5	2.1r	107.2	-1.2
March	130.5	3.2	109.0r	2.2r
April	130.3	2.5	108.2r	1.0
May	129.0r	0.1r	107.7r	0.1r
June	131.2	3.3	110.1	4.5

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**

	May	June
Leading Index		
1. Average weekly hours, nonferrous metals (except aluminum) (NAICS 3314)	-0.6r	1.4
2. New orders, nonferrous metal products, (NAICS 3313, 3314, & 335929) 1982\$	0.1	0.0
3. S&P stock price index, building products companies	-0.3	0.5
4. LME spot price of primary copper	0.2	0.0
5. Index of new private housing units authorized by permit	-0.3	-0.2
6. Spread between the U.S. 10-year Treasury Note and the federal funds rate	-0.1	0.0
Trend adjustment	0.0	0.0
Percent change (except for rounding differences)	-1.0r	1.7
Coincident Index		
1. Industrial production index, primary smelting and refining of copper (NAICS 331411)	-0.1	0.2
2. Total employee hours, nonferrous metals (except aluminum) (NAICS 3314)	-0.5r	1.9
3. Copper refiners' shipments (short tons)	NA	NA
Trend adjustment	0.1	0.1
Percent change (except for rounding differences)	-0.5r	2.2

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, 1992-2014

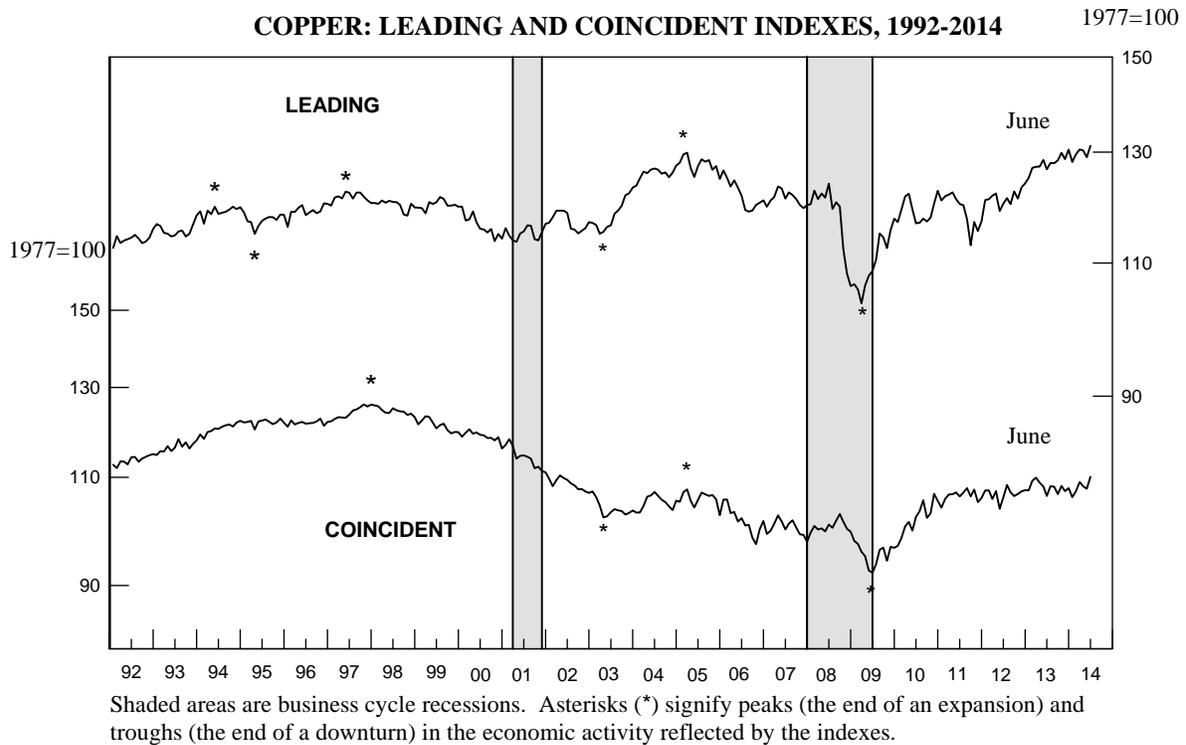
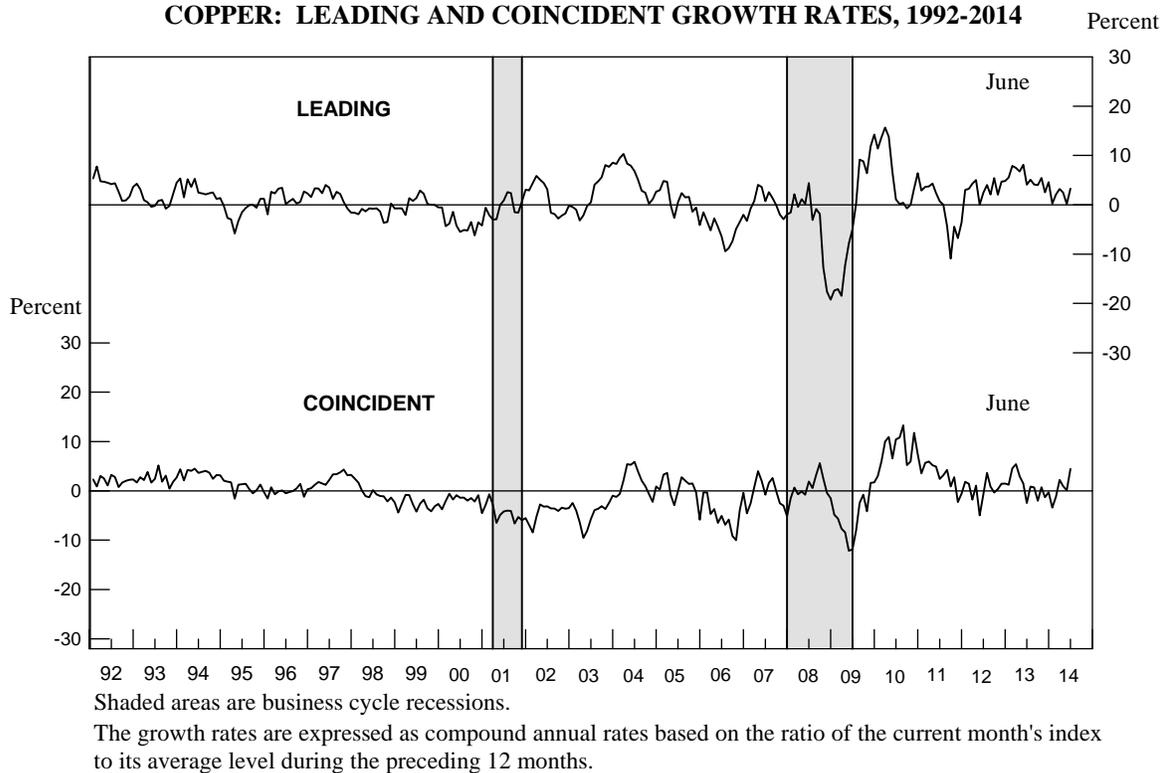


CHART 7.
COPPER: LEADING AND COINCIDENT GROWTH RATES, 1992-2014



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:

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

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

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

The next update for these indexes is scheduled for release on the World Wide Web at 10:00 a.m. EDT, Friday, September 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