

# Commodity Prices Follow Gold — A Leading Indicator of Inflation

Backgrounder No. 172

by R. David Ranson

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*Market analysts usually attribute changes in the prices of commodities — uniform, widely traded goods, such as metals — to higher or lower demand in major world economies, such as the United States and China. However, the price of a commodity also relates to the value of the currency in which prices are expressed, in most cases the U.S. dollar.*



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A fall in the value of a currency is easily recognized in the form of its depreciation relative to gold.<sup>1</sup> Commodity prices followed the decline in gold prices starting in 2011, after following a long rise in gold prices beginning in 2001. In April 2013, the price of gold plunged another 15 percent, and economists expect commodity prices will follow gold with the same decline.

Global commodity prices also respond to economic growth in the short run, but these price changes are rarely sustained over time.<sup>2</sup> Supply and demand and existing inventories do not explain the long-run behavior of commodity prices. Over the long term, commodity prices are part of a general movement in the prices of tangible assets — including commercial real estate, precious metals and collectibles. The prices of all of these are driven primarily by the changing value of the U.S. dollar. How do commodity prices relate to the long-run history of the U.S. dollar? What is the present commodity price outlook?

**Industrial-Metals Prices Before World War I.** We have longer historical price data for industrial metals than most other statistics. The U.S. Bureau of Mines (BOM) has published annual price averages since the 19th century. From mid-1946, Reuters Bridge Commodity Research Bureau (CRB) has compiled monthly spot-price data for about two dozen commodities. The CRB Index includes copper, lead and steel scrap, tin and zinc. (The base metals included in the calculations below include aluminum, copper, lead, nickel, steel scrap, tin and zinc.) From these data, we can see something of the long-term trend in commodity prices.

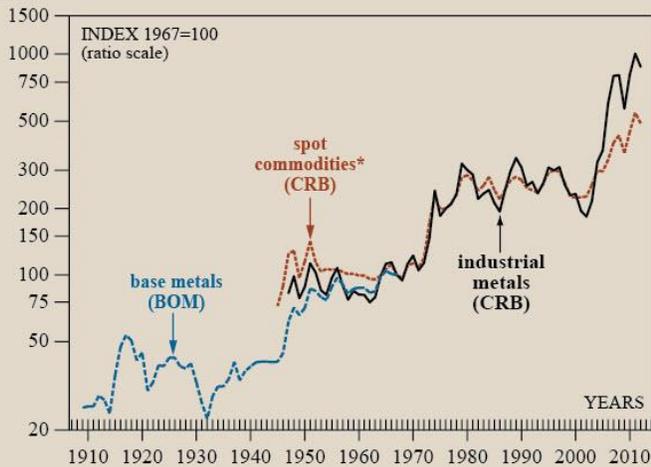
Figure I illustrates the average annual history of the BOM and CRB indices, beginning in 1909, plotted on a ratio scale. The roller-coaster like price swings in the chart suggest that industrial-metals prices fluctuate with even wider amplitude than other commodities.

**Industrial-Metals Prices as an Inflation Indicator.** It is no coincidence that highs in commodity prices coincide with highs of inflation, as indicated by such measures as the consumer price index (CPI). Figure II shows how the CPI tends to rise more rapidly after industrial-metals prices rise, and to decelerate after they decline. To show this, the sample of 39 years is divided into three subsamples in which metal prices changed to different degrees. The average path of the CPI is shown for each subsample separately.

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Figure I

### Price History of Industrial Metals and Other Commodities calendar-year averages, from 1909



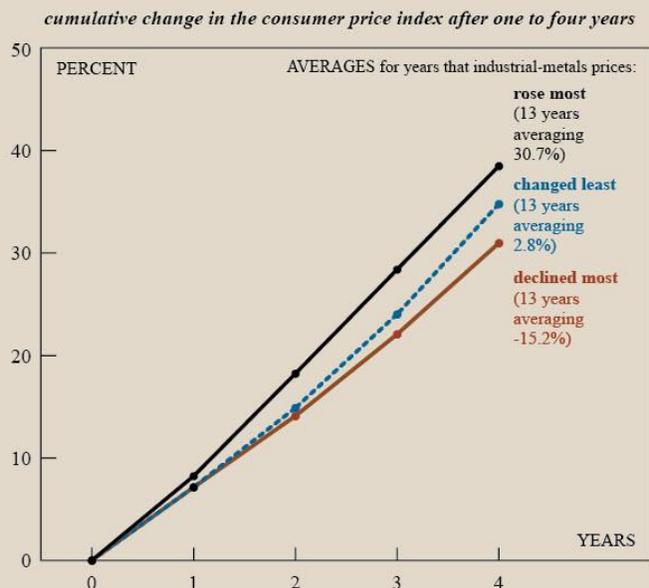
\* Excluding energy.

Note: Some overlapping years are included to show that the CRB and the Bureau of Mines roughly agree.

Source: Annual averages of month-end prices for all commodities other than energy and for industrial metals (Reuters Bridge Commodity Research Bureau) and annual prices for base metals (Bureau of Mines/H.C. Wainwright Economics).

Figure II

### Industrial-Metals Prices as a Leading Indicator of CPI Inflation from 1950



Source: Calendar-year averages of the monthly alternate consumer price index based on constant 1980 methodology (Shadowstats) and of month-end price index for industrial metals (Reuters Bridge Commodity Research Bureau).

Least-squares analysis confirms that movements in industrial-metals prices, as with gold, are leading indicators of inflation. But in further testing, the correlation with subsequent CPI movements is not as close as for the

precious metals, nor do industrial metals move as early.<sup>3</sup>

Figure III illustrates the fact that precious-metals prices are, in turn, a leading indicator of industrial-metals prices. Again, the 39-year sample is divided into three equal subsamples in which the price of gold changed to different degrees. The average path of the industrial-metals index is shown for each subsample separately. As price movements in industrial metals anticipate inflation, price movements in precious metals anticipate the industrial metals.

Figure III suggests that it takes two or three years to reach the widest divergence in prices in different gold-price environments. There is a strong correlation between gold and both immediate and subsequent price movements in industrial metals. The average time lag is about six months.

Any major movement in the price of gold is followed, over the next year or two, by a consequent move in commodity prices — assuming that there is no offsetting change in the supply-demand balance resulting from a change in the rate of global economic growth.

As Figure IV illustrates, metals prices tend to move in the same direction as gold. Some of the response is immediate, while the rest takes a few months to occur. Metals prices were weak after gold peaked in 2011, and weaker still in April 2013 when there was an even more abrupt drop in gold.

**Response of Different Commodity Groups to the Price of Gold.** Gold prices change more rapidly than other indicators of inflationary pressure, including commodity prices. Figure V illustrates the leading role of gold in influencing the price behavior of several commodity groups — textiles and fibers, foodstuffs and crude oil. The data suggest a wide range of price sensitivity to gold in different commodity groups. But in all cases, it takes at least three years for the effects of a change in the price of gold to be fully reflected in the prices of any of these commodity groups.

Commodity prices are much more closely correlated with gold than with consumer prices. The price of gold may move a long way with very little response in the official cost of living, just as it did in the previous decade.

**Comparative Influence on Metals Prices of Changes in the Dollar and Changes in National Output.** The relationship between one variable and another can be summarized by their correlation coefficient, and Table I shows correlation coefficients between industrial-metals price movements and the two economic variables with which they are most closely connected.

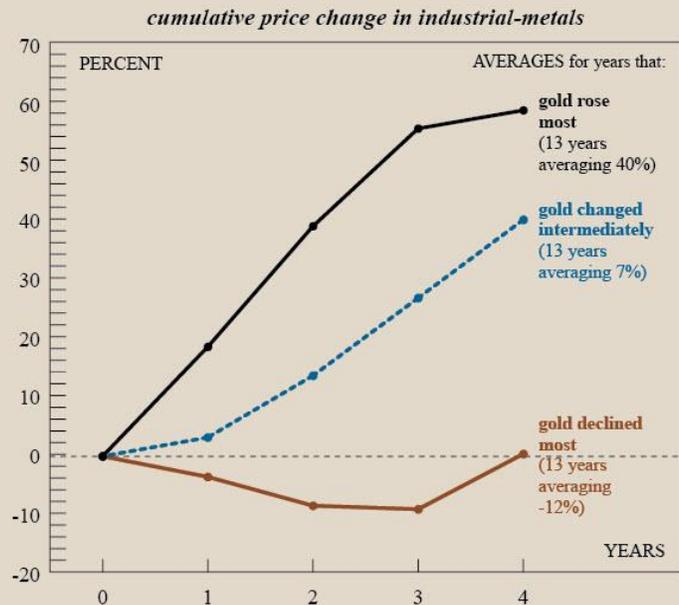
The table demonstrates, first, that the relationship between real gross domestic product growth and changes in metals prices is purely cyclical. In other words, the effect growth has on prices does not last. This can be seen by recalculating the correlation using longer and longer time frames. Growth is positive and quite strong in the short run, but diminishes and eventually reverses itself over longer periods. The middle column of Table I illustrates this pattern, comparing the correlation between annual changes in the data with the correlations between two-year, five-year, 10-year and 20-year changes.

Thus, the positive relationship between metals prices and GDP disappears with the passage of time. Although positive for the first two years, the years that follow show a negative correlation. The relationship is positive on a cyclical basis, probably reflecting the influence of economic growth on the supply-and-demand picture for metals. But on a longer-term basis the relationship is inverse, probably reflecting the negative influence of inflation (as expressed by metals prices) on economic growth.

Table I also demonstrates that the relationship between price movements in metals and gold works very differently. The correlations in the right-hand column are strong, and become stronger still over longer time frames. Thus, there is both a cyclical and long-term relationship between gold and other metal price movements.

The relationship between real gross domestic product growth and changes in industrial-metals prices is purely cyclical. The correlation is quite strong in the short run, but diminishes and reverses itself over longer time frames. The first column of Table I compares the correlation between annual changes in the data with the correlations between two-year, five-year, 10-year and 20-year changes.

**Figure III**  
**Gold as a Leading Price Indicator for Industrial Metals**  
from 1970



Source: Calendar-year averages of the monthly alternate consumer price index based on constant 1980 methodology (Shadowstats) and of month-end price index for industrial metals (Reuters Bridge Commodity Research Bureau); together with calendar-year average spot prices for gold (*Metals Week*).

**Figure IV**  
**Gold and Commodity Prices**  
since the end of 2011



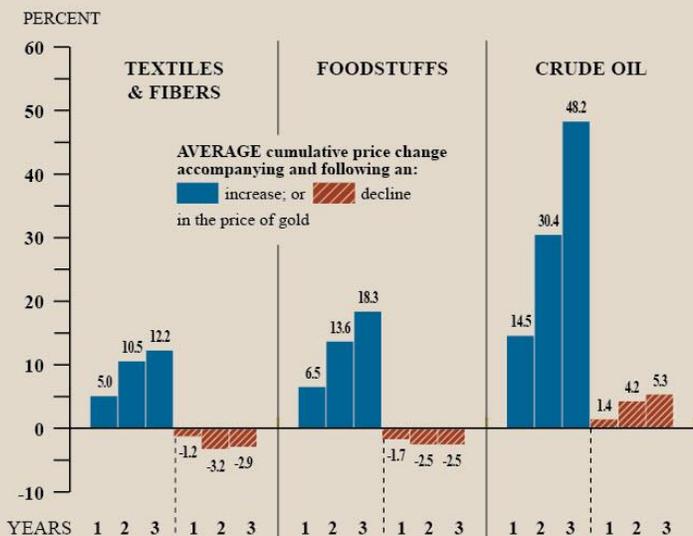
Source: Calendar-year averages of the monthly alternate consumer price index based on constant 1980 methodology (Shadowstats) and of month-end price index for industrial metals (Reuters Bridge Commodity Research Bureau).

Table I demonstrates that the positive relationship between metals prices and GDP diminishes over time. Changes in the prices of industrial metals account for about one-fourth of the change in GDP one year later.

Figure V

## Gold as a Leading Indicator for Diverse Commodity Groups

calendar-year average data from 1950



Source: Calendar-year averages of month-end prices for textiles & fibers, foodstuffs and crude oil (Reuters Bridge Commodity Research Bureau) and gold (*Metals Week*).

Although positive for the first two years, the years that follow show a negative correlation that may disappear over time. These results show a positive relationship on a cyclical basis, probably reflecting the influence of economic growth on the supply and demand picture for metals. But on a longer-term basis the relationship is inverse, probably reflecting the negative influence of inflation (as expressed by metals prices) on economic growth.

The second column of Table I shows that the relationship between the price movements of metals and gold works very differently. This correlation is also strong, and also becomes even stronger as the time frame for expressing changes in the data lengthens. The relationship with gold is both cyclical and long term.

**Conclusion.** The prices of industrial metals and other commodities are correlated with gold, but take time to respond fully to movements in gold prices. When gold plunged in April 2013, industrial metals prices dropped as well. The reason is not a

matter of supply and demand in the usual sense; we measure all these prices in U.S. dollars, and the value of the dollar simply rose. Since June, the dollar has been falling, the price of gold has been rebounding and metals prices have begun to climb back too. While lagging behind gold, industrial-metals prices perform in advance of inflation.

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Table I

## Correlations between Price Changes in Industrial Metals and Changes in the Price of Gold and Real GDP

multi-year average data from 1949

Data time frame (years)	Correlation with changes in real GDP	Correlation with changes in the price of gold
1	<b>+.258</b>	<b>+.418</b>
2	<b>+.159</b>	<b>+.513</b>
5	<b>-.195</b>	<b>+.527</b>
10	<b>-.548</b>	<b>+.589</b>
20	<b>-.177</b>	<b>+.635</b>

Source: Annual averages of month-end prices for all commodities other than energy and for industrial metals (Reuters Bridge Commodity Research Bureau) and annual prices for base metals (Bureau of Mines/H. C. Wainwright Economics). The base metals included in our calculation include aluminum, copper, lead, nickel, steel scrap, tin and zinc. The metals included in the Commodity Research Bureau Index are copper scrap, lead scrap, steel scrap, tin, and zinc; together with annual totals of real gross domestic product (Bureau of Economic Analysis).

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