SUMMERHAVEN
INVESTMENT MANAGEMENT, LLC

Industrial Metals as Investment

Introduction

In recent years, investors' interest in commodity sector-specific investment products has increased. Commodity sector products allow investors to retain the benefits of commodity investments, while tailoring their commodity holdings to fit specific tactical views.

This article explores the return characteristics of industrial metal futures. The specific metals examined are aluminum, copper, nickel, zinc, tin, and lead. These metals are essential inputs to a wide range of industrial and consumer products such as steel (nickel and zinc), electric wire (copper), batteries (lead), solder (tin), and aluminum cans.

Industrial metals as a long term investment

Table 1 presents the returns for the individual industrial metals, measured over the period reliable data is available. Copper futures trade on both the London Metals Exchange (LME) and the COMEX. We use COMEX copper prices because of their longer available history. The other metals prices are the "third Wednesday" prices, and taken from the LME. Investment returns are based on taking a long position, at the end of each month, in the nearest to expiry future that does not have its first notice date[1] in the next month.[2] The returns are fully-collateralized, meaning the investor invests the entire face value of the contract in one-month Treasury bills. The investment return is the price change of the contract plus collateral interest.

Table 1: Fully-collateralized returns of individual industrial metals, January 1970 - September 2011

	Total Returns	Annualized Volatility	Sharpe Ratio	Start Date
Aluminum	2.04%	24.19%	0.05	Jul-87
Copper	9.65%	27.75%	0.28	Jan-70
Lead	6.40%	26.99%	0.18	Mar-77
Nickel	9.95%	37.66%	0.29	May-79
Tin	6.07%	22.48%	0.22	Aug-89
Zinc	5.64%	25.36%	0.15	Feb-77

[1] First Notice Day: The first day on which notices of intent to deliver actual commodities against futures market positions can be received.

[2] Data Sources: Commodity Research Bureau (CRB), LME, and Bloomberg.

The best performer in terms of geometric (compounded) return is Nickel, which is also the most volatile. The metal with the weakest performance is aluminum, the third most common element in the earth's crust (after oxygen and silicon).

While all metal returns are positive, individual metals are volatile. However, as displayed in Table 2, correlations of the metals to each other range from 0.33 to 0.54, allowing a diversified portfolio of metals to have significantly lower volatility than the individual metals.

Table 2: Correlation of monthly returns, January 1970 - September 2011

	Aluminum	Copper	Lead	Nickel	Tin	Zinc
Aluminum	1					
Copper	0.54	1				
Lead	0.33	0.45	1			
Nickel	0.52	0.49	0.34	1		
Tin	0.49	0.45	0.37	0.47	1	
Zinc	0.40	0.54	0.50	0.39	0.37	1

We construct an equal-weighted, fully-collateralized portfolio of industrial metals. As suggested by the dates in Table 1, initially the portfolio contains only copper. It is not until August 1989 that all six metals are available for inclusion. Table 3 reports the historical returns of the industrial metals portfolio compared with the major asset classes: stocks, bonds, [3] and one month treasury bills.

Table 3: Asset class returns, January 1970 - September 2011

	Total Returns	Annualized Volatility	Sharpe Ratio
Industrial Metals	8.60%	21.86%	0.25
S&P 500	9.56%	15.66%	0.34
Bonds	8.13%	6.21%	0.46
One-month T-bills	5.26%	0.86%	-
60-40 Stock Bond Portfolio	9.30%	10.3%	0.42
80% (60-40 Stock Bond Portfolio) + 20% Industrial Metals	9.58%	10.1%	0.45

The average annual return of the industrial metals portfolio is significant, with fully-collateralized returns of 8.60%. This is comparable to the return for equities, which is 9.56%. The metals portfolio does have a higher volatility than equities (21.86%

[3] Bond returns are composed of Ibbotson Associates SBBI Long US Term Government Total Returns from January 1970 to January 1976; and Barclays Capital US Aggregate Bond Index Total Returns since February 1976.

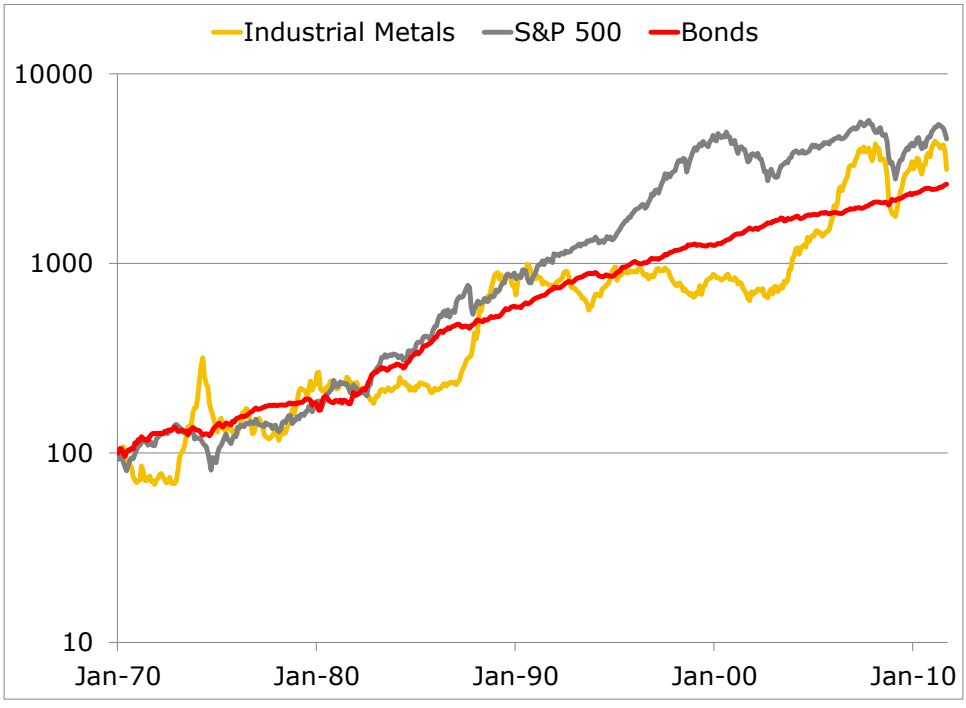
compared with 15.66%), but the stock portfolio holds five hundred securities, while the metals portfolio holds at most six. Figure 1 displays these results graphically (log scale). The monthly correlations are displayed in Table 4. The correlation between metals and equities is 0.25 and the correlation with bonds is -0.11.

Since the average return for metals is comparable to the average returns for equities and bonds, the low correlations suggest that metals might be a useful addition to a portfolio of stocks and bonds. To explore this we compare a traditional 60-40 stock-bond portfolio with that portfolio combined with 20% of the equal-weighted industrial metals portfolio (i.e. 48% stocks, 32% bonds, and 20% industrial metals). This new portfolio has a higher return and lower volatility than the traditional 60-40 portfolio.

Table 4: Monthly correlation January 1970 - September 2011

	Industrial Metals	S&P 500	Bonds
Industrial Metals	1		
S&P 500	0.25	1	
Bonds	-0.11	0.26	1

Figure 1: Cumulative returns (log scale), January 1970 - September 2011



Industrial metals as a tactical investment

For investors who are interested in using a portfolio of industrial metals as a tactical investment, it is useful to understand their return characteristics under different macroeconomic scenarios. Table 5 presents the annual correlation of the metals portfolio with a US Dollar index, global industrial production, unexpected inflation, and the Consumer Price Index. [4]

Table 5: Annual return correlations, January 1970 - September 2011

	Dollar index	Industrial Production	Unexpected Inflation	Inflation
Metal Returns	-0.33	0.47	0.22	0.13

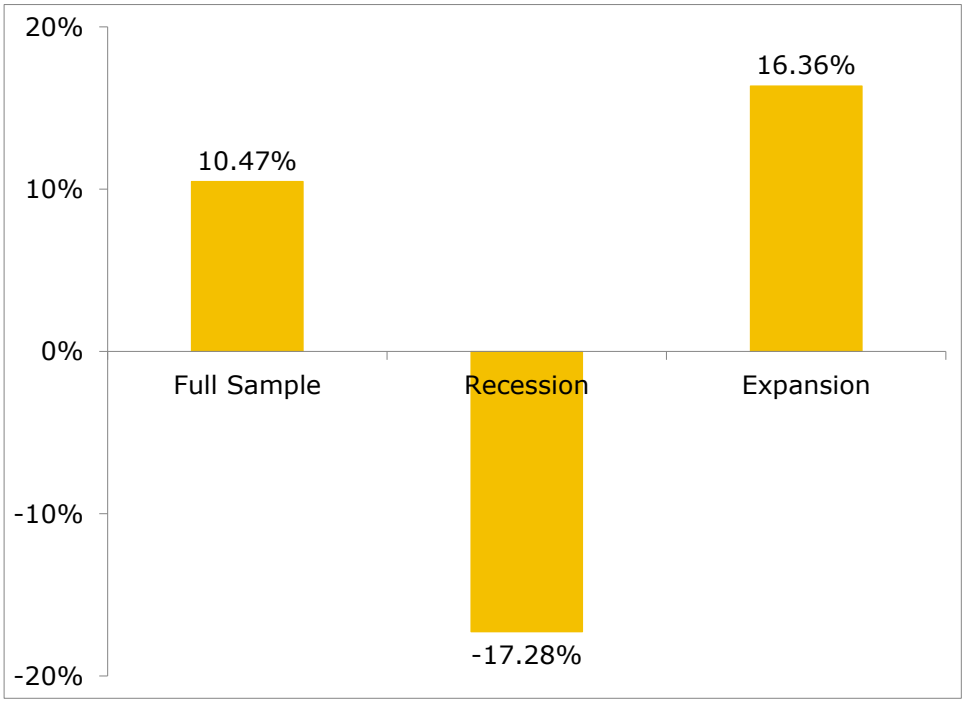
The correlations of largest magnitude are with the Dollar Index (-33%) and industrial production (47%). The high correlation between metals and industrial production is not surprising. Industrial metals, as their name suggests, are used in production and should therefore be expected to be sensitive to economic activity. The negative correlation with the Dollar index suggests that metals retain their positive return characteristics during periods of US Dollar decline. Finally, metals have a moderately positive correlation with unexpected inflation (22%) and inflation (13%). Thus, as previously shown for a broadly-diversified commodity portfolio,[5] metals, unlike equities, tend to generate positive returns when inflation is high.

The relation between metals returns and economic activity can further be explored by examining their behavior during recessions and expansions. Figure 2 presents this analysis. The difference between metal returns in expansions and recessions is striking. Industrial metals do very poorly during recessions and very well during expansions.

[4] Inflation is based on US CPI Urban Consumers SA (source: Bloomberg). US Dollar index is a spliced return series of Trade Weighted Exchange Index: Major Currencies as calculated by Board of Governors of the Federal Reserve System (starting 1973) and DXY index (before 1973) which is composed of a basket of five currencies, Euro 57.6%, Yen 13.6%, Sterling 11.9%, Canadian Dollar 9.1%, Swedish Krona 4.2%, and Swiss Franc 3.6% (source: Bloomberg, and FRED). Global Industrial Production series is based on GDP weighted industrial production of the following countries United States, Germany, Japan, France, South Korea, Italy, UK, Canada, and Russia (source: IMF and Bloomberg). Unexpected inflation is defined as the difference between inflation and one month Treasury bill returns.

[5] Gorton, G. and K. Geert Rouwenhorst (2006), "Facts and Fantasies about Commodity Futures," Financial Analysts Journal 62(2): 47–68.

Figure 2: Average industrial metals returns and the business cycle January 1970 - June 2009[6]



Basis as a driver of industrial metals returns

Recent research has suggested that basis[7] can be used as a price-based proxy for inventories, and positive basis indicates lower inventories. [8] Further, this branch of research has concluded that commodity futures earn a higher risk premium when inventories are lower than normal. Figure 3 displays the results of the returns[9] of the metals portfolio conditional on whether the average basis of metals is positive or negative at the beginning of the month.

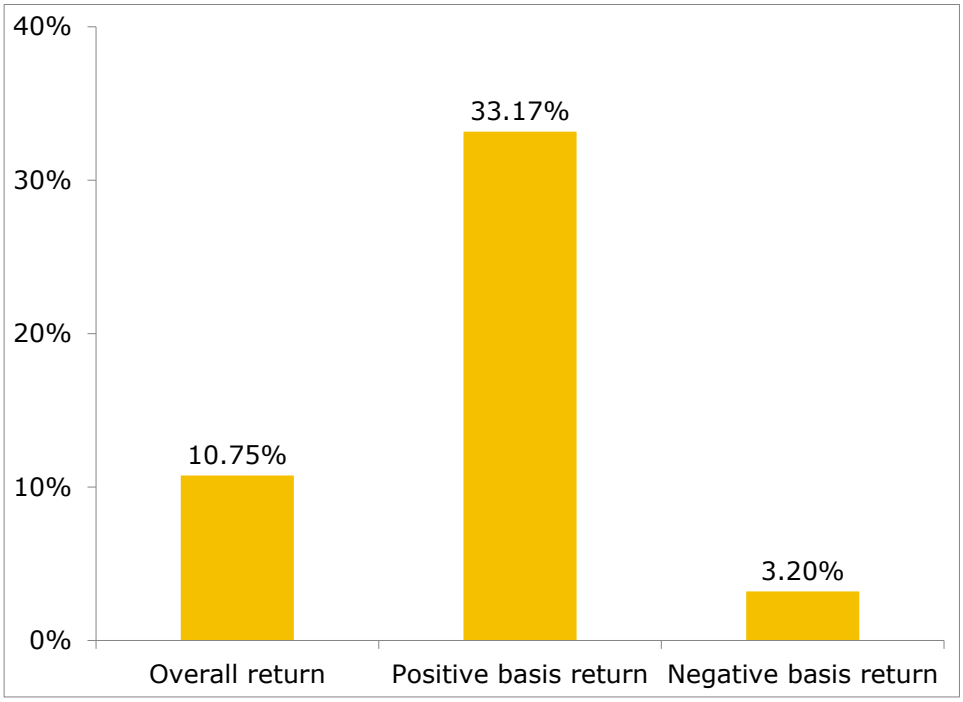
[6] Based on business cycle dates from the National Bureau of Economic Research. Annualized arithmetic average returns.

[7] Basis is defined as the F1/F2-1, that quantity annualized. Where F1 is the price of the front listed contract and F2 is the price of the second listed contract. It is measured on the last day of the month.

[8] Gorton, Gary, Fumio Hayashi, and K. Geert Rouwenhorst, (2008), "The Fundamentals of Commodity Futures Returns," Yale ICF Working Paper No. 07-08. New Haven, Conn.: Yale University.

[9] Annualized arithmetic average returns.

Figure 3: Average industrial metal returns conditional on basis, February 1970 – September 2011



Positive basis count	126
Negative basis count	374

Note that the basis is negative about 75% of the time. This is consistent with the broader universe of commodities, and is in part due to storage and opportunity costs. When the basis is negative, the average annual return is 3.20%. Most striking is the return when the basis is positive (i.e. the curve is backwardated). A positive basis is associated with a return of 33.17%. The 25% of the time in which the market is in backwardation accounts for 75% of the returns.

Conclusion

A portfolio of industrial metal futures would have performed almost as well as equities over the last forty years with a correlation to equities of only about 25%. Unlike equities, metals returns are not negatively impacted by inflation. Metals do particularly well during periods of economic growth, making them useful for implementing tactical views of economic recovery. Metals also earn a higher risk premium when the basis is positive.

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