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**A Commentary on the Correlation of Copper and Crude
A Monday Morning Musing from Mickey the Mercenary Geologist**

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My bullish views on copper in the mid- to long-term are well-known. But despite strong supply-demand fundamentals, the short-term price outlook for copper is equivocal at best.

Price uncertainty exists for the entire industrial metal complex due to the ongoing trade dispute between the United States and China. China is by far the largest consumer of metals in the world with America in second place but far behind. Questions regarding a slowing Chinese economy that is also weakened by the tariff snafu are well-founded and have cast a pale over normally robust speculative markets for both hard and soft commodities.

As a result, hedge fund speculators have largely abandoned the derivative markets for industrial commodities with the gross numbers of futures and options contracts at near-historic lows for both the energy and metal sectors.

Regardless of all the ambivalence, students of macroeconomic trends know that the world runs on oil and copper is a leading indicator of world economic health.

Some pundits have commented on a recent price divergence between copper and crude oil, the two most important world exchange-traded commodities. They produced a 17-year chart of prices and noted that since 2002, copper and oil have had a strong positive correlation at 0.84.

Although this is indeed true, we urge caution when looking at such long-term composited metrics as they are often misleading.

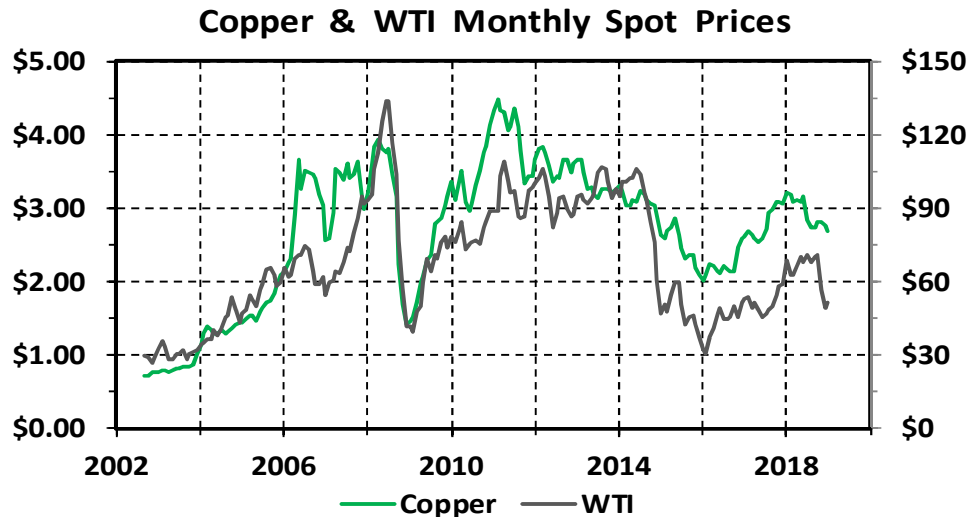
In addition, the case was made that a long-standing price relationship is now changing; i.e., copper and oil prices are no longer correlated. Evidence for this is apparently based on the downturn in the price of oil from mid-October to late-December while copper remained flat from mid-October until mid-December.

I submit that calculating an overall correlation coefficient for 17 years' worth of daily prices for copper and crude produces a fallacious metric that is merely an artifact of the very long time period under consideration.

Furthermore, I opine that extrapolating a two-month contrarian trend to predict a fundamental change in the relationship between two major commodities is neither reasonable nor logical.

And I will show you exactly why in the data that follows.

Our giant (38 megabyte) commodity and economic database includes daily spot WTI oil prices and daily spot London copper prices from August 2002. Sources are the US Energy Information Administration (EIA) and the London Metals Exchange (LME). Here's a composite copper and oil chart of monthly average prices:



For this analysis, we took daily copper and oil prices and computed short-, medium-, and long-term correlation coefficients beginning in the summer of 2002 and continuing to present. Our products include running 20-day, 50-day, 100-day, and 200-day correlation coefficients. For good measure, we also calculated yearly correlations.

Following our usual protocol, we consider coefficients of ≥ 0.6 or ≤ -0.6 to represent strongly correlated spot prices of copper and oil in a respective positive or negative relationship.

Here are the results for strong positive correlations (≥ 0.6) of copper and crude with percentages of the total days since 2002 or 2003:

- 20-day correlations: 1381 of 4105 daily records for 33.6%;
- 50-day correlations: 1580 of 4075 daily records for 38.8%;
- 100-day correlations: 1659 of 4025 daily records for 41.2%;
- 200-day correlations: 1955 of 3925 daily records for 49.8%.

Our analysis shows that since mid-2002, daily prices of copper and crude have been strongly correlated over particular intervals (i.e., they go up and down together in near-linear tandem) from 1/3 to 1/2 of the time.

Taking our treatment a step further, we determined the strong negative correlations (≤ -0.6) for copper and crude over the same running time periods. Here are those results:

- 20-day correlations: 217 of 4105 daily records for 5.3%;
- 50-day correlations: 154 of 4075 daily records for 3.8%;
- 100-day correlations: 52 of 4025 daily records for 1.3%;
- 200-day correlations: 0 of 3925 daily records.

The record shows that copper and crude oil are actually *negatively* correlated (i.e., when one goes up the other goes down in a strong linear relationship) on occasion over generally short periods.

Furthermore, copper and crude oil prices are positively correlated to a significant degree for only six years (**highlighted**) of the 16-year data set: 2005, 2008 to 2010, 2012, and 2015. With exception of 2012, these were years when prices were either rising rapidly or crashing hard for the *entire* natural resources sector:

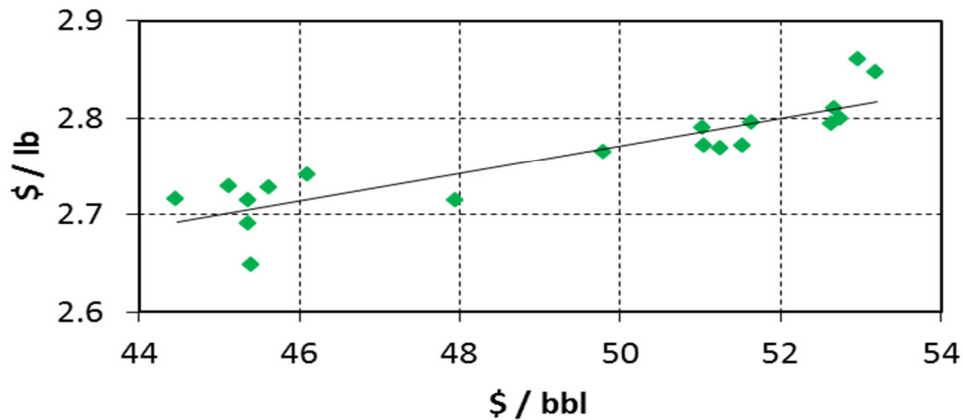
Yearly Correlations	
2003:	0.06
2004:	0.39
2005:	0.68
2006:	0.39
2007:	0.37
2008:	0.91
2009:	0.93
2010:	0.80
2011:	0.26
2012:	0.71
2013:	-0.32
2014:	0.51
2015:	0.82
2016:	0.40
2017:	0.58
2018:	0.16

Regardless of how we dissect the correlation data, here's the gist of the story over the past 16-plus years:

For correlations from as short as 20 days to as long as 200 days and also by calendar year, there is no significant positive correlation of copper and crude oil spot prices for one-half to two-thirds of these intervals.

Now let's look at a scattergram for prices of copper and crude from November 30 to January 9:

WTI & LME Copper Correlation Coefficient: 0.88



Albeit a relatively short-term record, this is indeed a strong positive correlation and further negates the premise that a new price paradigm is emerging for copper and oil.

The strong late November to early January correlation occurred in the face of recent macroeconomic factors that logically should have produced a divergence of copper and oil prices. These include:

- a world glut of oil that caused a major correction in its price from mid-November thru early January;
- a range-bound copper price that was in extreme backwardation until mid-January;
- no end in sight for the trade dispute between the US of A and China;
- very little interest from speculators in derivatives markets that spawned a focus by traders on front-month contracts, i.e., the here and now.

In examining over 16 years of daily data, we see little evidence for a predictably strong relationship between copper and crude oil prices over the short-, mid-, and long-terms. Their prices are strongly correlated in either the positive or negative sense less than half of the time for all intervals and years that we analyzed.

Moreover, statistical analysis of very recent data shows no evidence for a paradigm shift in their price relationship (or more often, the lack of one).

Folks, I think we can conclude only the following for the foreseeable future:

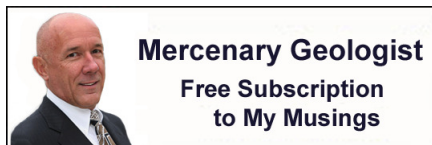
- the world has, does, and will continue to run on oil;
- demand for crude oil will continue to increase by about 1.4% annually;
- copper will remain an all-important industrial metal as world population increases and remote areas in Eastern Asia gain infrastructure and are electrified;

- demand for copper will continue to increase at an annualized 3.4% per year just as it has since 1900.
- future market share of electric vehicles may increase copper demand incrementally in the coming decades but by a very small amount;
- the vast tonnages of copper required for grid electricity, electronics and communications, construction, industrial machinery and equipment, and conventional transportation will continue to dominate its usage.

Finally, we are in full agreement with our peers that copper is poised to soar once American and Chinese trade issues are settled.

Ciao for now,

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The [Mercenary Geologist Michael S. “Mickey” Fulp](http://MercenaryGeologist.com) is a Certified Professional Geologist with a B.Sc. Earth Sciences with honor from the University of Tulsa, and M.Sc. Geology from the University of New Mexico. Mickey has 35 years experience as an exploration geologist and analyst searching for economic deposits of base and precious metals, industrial minerals, uranium, coal, oil and gas, and water in North and South America, Europe, and Asia.

Mickey worked for junior explorers, major mining companies, private companies, and investors as a consulting economic geologist for over 20 years, specializing in geological mapping, property evaluation, and business development. In addition to Mickey’s professional credentials and experience, he is high-altitude proficient, and is bilingual in English and Spanish. From 2003 to 2006, he made four outcrop ore discoveries in Peru, Nevada, Chile, and British Columbia.

Mickey is well-known and highly respected throughout the mining and exploration community due to his ongoing work as an analyst, writer, and speaker.

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