Deconstructing The Commodity Surge

Even though you may have to explain to your grandchildren what a newspaper was, you might not have to explain to anyone why the very small agate fonts were used for two purposes, the tables in both the financial and sport pages. Both endeavors generate a lot of data and invite a great deal of statistical analysis. The real question in the case of market analysis is why so many commentators in the world of commodity futures choose to ignore Socrates and live an unexamined life. Who knows; perhaps it is easier to run one's mouth than to run some data analysis?

A Market Of Commodities
Let's take a look at the extraordinary rally in physical commodity markets from September 2007 into July 2008, specifically the July 3, 2008 high of the Dow Jones-AIG commodity index. Note the use of the phrase, "physical commodity markets," as opposed to "commodities." Until the advent of the long-only commodity index fund, the criticism of which would require a complete article in its own right, no one conversant with the subject would have lumped metals, energy, grains and softs together. These were a collection of unrelated markets, often with negative correlation of returns between them. They are now grouped together solely by virtue they are tangible and traded on an exchange.

Let's end this folly and look at a set of 19 different cash markets instead of the collective "commodities." Cash markets eliminate the distortions of contract rolls. An exception will be made for coffee, which like orange juice lacks a reliable cash market series; here a continuous front-month futures series will be used.

Next, while some attributed the commodity surge to abstractions such as "the weaker dollar," or "loose monetary policy," let's refine these measures down to individual markets as well. Two individual currencies will be used, the euro, which dominates the dollar index with its 57.6% weight, and the Chinese yuan, whose different trading regimes will define the study below. As China is the fastest-growing importer of numerous commodities, the strength of the yuan affects the price and demand of various commodities significantly.

The same sort of division will be used for inflation and monetary policy. We can convert the five-year TIPS breakeven rate of inflation into an interest rate and create a constant-maturity five-year note from this rate. We can do the same for short-term interest rates. As both Treasury bill rates and LIBOR were distorted by various aspects of the credit crunch, we will use three-month repo rates and convert them into a bill of constant three-month maturity.

Chinese Yuan Regimes
Let's set up a small comparison across three time periods. The color-coding scheme will remain uniform throughout.

1. May 6, 2003 – July 20, 2005 (green). This is the period between the Federal Reserve's declaration of war on deflation and the last date when China maintained a peg for the yuan against the dollar;
2. July 21, 2005 – October 17, 2007 (blue). This is the period when the yuan was allowed to revalue gradually. All charts are sorted on this period; and
3. October 18, 2007 – July 3, 2008 (red). This period was when the Chinese, under pressure from U.S. protectionists and with the acquiescence of the Treasury Department, allowed the yuan's revaluation to accelerate.

The average daily returns for each commodity are presented below. How did each of the four factors affect the movements of these commodities over the three time periods involved? We will answer these questions by correlating returns for each commodity against each factor over each period, displaying the correlation coefficients and then testing whether regressions of each commodity against each factor changed in a statistically significant manner from period to period.

Average Daily Returns For Commodities Over Selected Periods
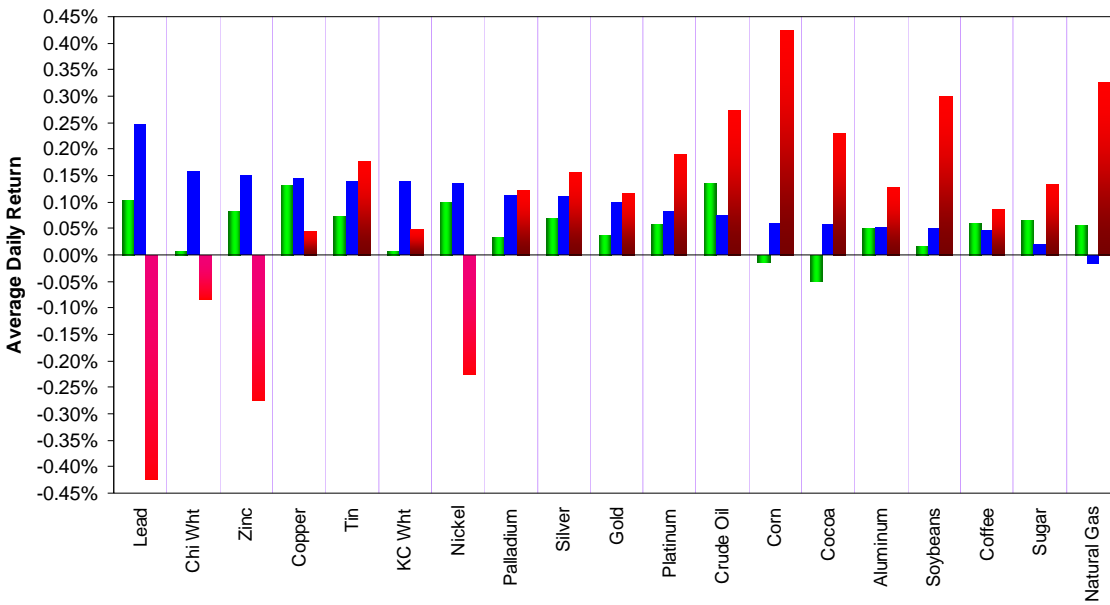
The degree to which Period 3 returns differed from those of the other two periods is obvious visually; are they different statistically, and at what confidence level? The table below measures the probabilities each period's average returns differ from the others. Here and in the subsequent tables, probabilities greater than 80% are highlighted with red font on a green background; probabilities less than 20% are highlighted in blue font on a yellow background.

Probabilities Returns Are Different

|	Period 1: Period 2	Period 2: Period 3	Period 1: Period 3	Period 3: Periods 1 & 2
Gold	68.1%	10.5%	50.6%	32.3%
Silver	29.0%	19.0%	37.9%	29.9%
Platinum	30.1%	56.3%	67.3%	63.5%
Palladium	51.3%	4.5%	41.0%	24.9%
Crude Oil	40.3%	75.3%	55.0%	68.9%
Natural Gas	21.7%	76.6%	68.8%	78.8%
Copper	10.2%	48.7%	46.1%	50.2%
Aluminum	3.9%	45.0%	49.6%	49.6%
Lead	78.0%	99.8%	98.9%	99.7%
Tin	48.3%	19.4%	51.0%	37.4%
Zinc	44.8%	95.1%	92.3%	94.8%
Nickel	19.2%	92.0%	88.8%	92.5%
KC Wht	73.8%	32.4%	17.2%	9.6%
Chi Wht	81.7%	54.0%	21.9%	39.6%
Soybeans	27.9%	88.2%	90.9%	91.2%
Corn	49.9%	96.5%	99.2%	98.8%
Sugar	31.8%	47.6%	30.9%	41.5%
Cocoa	74.2%	80.6%	95.2%	92.0%
Coffee	9.0%	18.8%	11.8%	16.3%
Yuan	100.0%	99.9%	100.0%	100.0%
Euro	38.7%	44.1%	61.5%	56.3%
Five-Year TIPS Inflation	7.0%	68.6%	64.4%	68.1%
Three-Month Repo	44.0%	93.5%	85.0%	91.3%

The only commodity statistically different between Periods 1 and 2 is soft red winter wheat, or "Chicago wheat." Lead, zinc, nickel, corn and sugar differ between Periods 2 and 3, while lead, zinc, nickel, soybeans, corn and cocoa differ between Periods 1 and 3. The commodities different between Period 3 and the combined data sets of Periods 1 and 2 are lead, zinc, nickel, soybeans, corn and cocoa. These lists are smaller than suggested visually.

The yuan differed between all data sets; this is unsurprising given how we established the data sets. The euro, surprisingly, never changed significantly between data sets. The three-month repo bill differed between all data sets except Period 1 from Period 2. The five-year TIPS inflation note never differed significantly from one period to another; this, too, is a surprise until you actually run the numbers.

The Yuan
How significant is the yuan against the individual commodities? Its correlation coefficients are shown below.

Comparative Correlation: Commodities Vs. Chinese Yuan
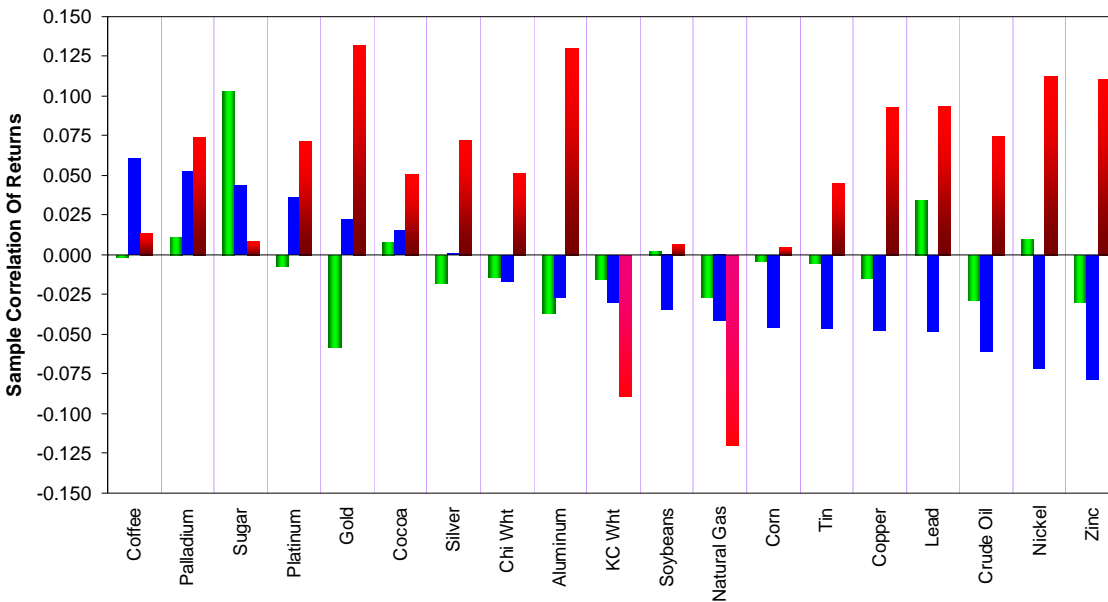
The regressions for every commodity against the yuan save nickel differed between Periods 1 and 2. How did this change once the yuan began to revalue? Between Period 2 and Period 3, the number of commodities whose regressions did not differ expanded to include silver, palladium, aluminum, tin, nickel, KC wheat, corn and coffee. The key impact of the yuan on various commodities was not its accelerated revaluation, but its initial revaluation.
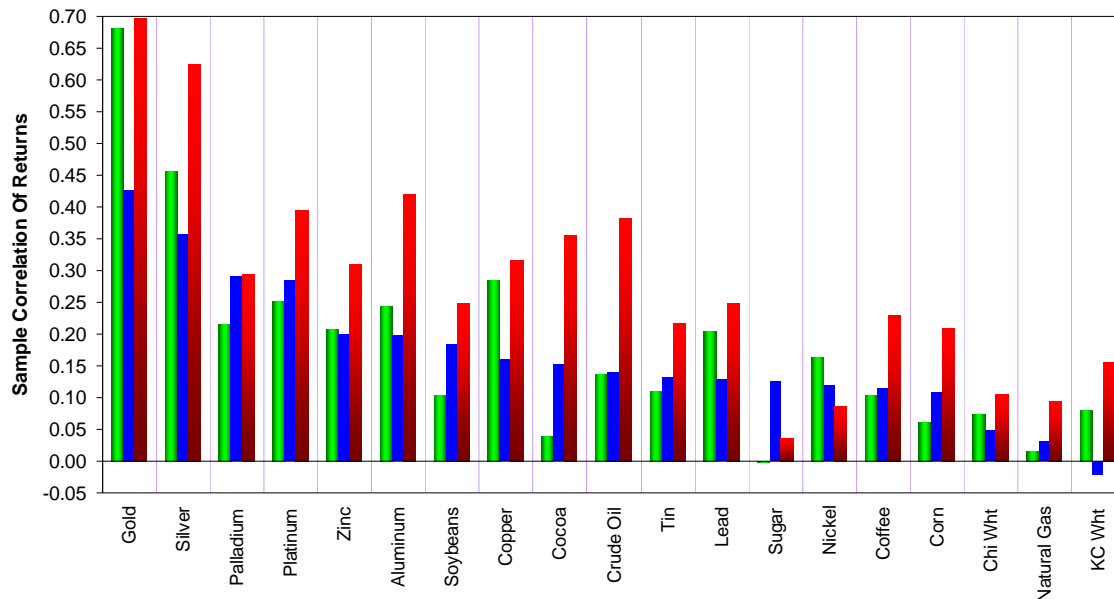
Probabilities Regressions Are Different

Against Yuan	Period 1: Period 2	Period 2: Period 3	Period 1: Period 3:
Gold	100.0%	99.8%	100.0%
Silver	100.0%	15.4%	100.0%
Platinum	88.0%	100.0%	100.0%
Palladium	86.8%	27.9%	50.8%
Crude Oil	100.0%	97.7%	65.1%
Natural Gas	100.0%	100.0%	100.0%
Copper	100.0%	99.3%	99.8%
Aluminum	100.0%	64.8%	100.0%
Lead	100.0%	100.0%	100.0%
Tin	100.0%	24.6%	100.0%
Zinc	100.0%	96.0%	100.0%
Nickel	49.7%	37.5%	1.9%
KC Wht	100.0%	54.4%	100.0%
Chi Wht	98.7%	100.0%	100.0%
Soybeans	100.0%	100.0%	72.0%
Corn	100.0%	37.5%	100.0%
Sugar	99.4%	95.3%	100.0%
Cocoa	100.0%	99.1%	94.1%
Coffee	100.0%	59.0%	96.1%

The Euro

When people say, "The dollar is weak," they really mean it is weak vis-à-vis the euro. Its correlation coefficients against the set of commodities are displayed below.

Comparative Correlation: Commodities Vs. Euro

Nickel was the only commodity whose regression against the euro did not change between Periods 1 and 2. Between Periods 2 and 3 the list expanded to include gold, palladium, crude oil, tin, nickel, KC wheat, corn and coffee. We can reach a conclusion very similar to that reached for the yuan; it was not the accelerated rally of the euro that boosted commodity returns in Period 3, but rather the substantial decline in the dollar against the euro after July 2005 that was responsible.
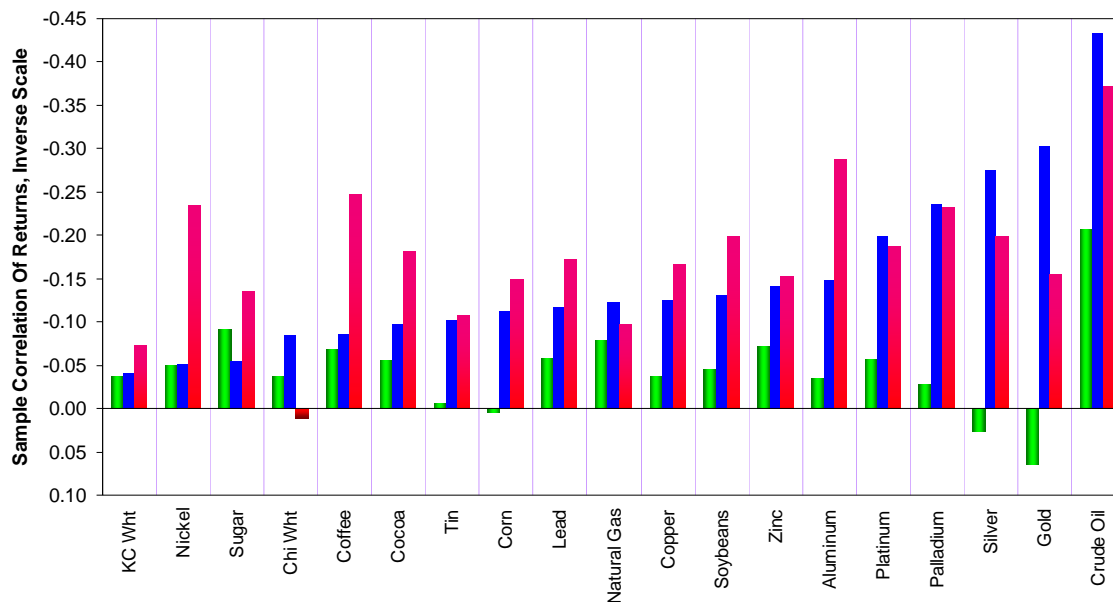
Probabilities Regressions Are Different

Against Euro	Period 1: Period 2	Period 2: Period 3	Period 1: Period 3:
Gold	100.0%	46.1%	100.0%
Silver	100.0%	99.3%	92.8%
Platinum	82.0%	100.0%	100.0%
Palladium	94.9%	27.8%	68.0%
Crude Oil	100.0%	72.5%	95.7%
Natural Gas	100.0%	100.0%	100.0%
Copper	100.0%	99.9%	99.7%
Aluminum	100.0%	96.0%	99.7%
Lead	100.0%	99.8%	100.0%
Tin	100.0%	42.9%	100.0%
Zinc	100.0%	88.9%	100.0%
Nickel	62.3%	28.8%	19.3%
KC Wht	100.0%	45.2%	100.0%
Chi Wht	98.8%	100.0%	100.0%
Soybeans	100.0%	100.0%	84.6%
Corn	100.0%	56.5%	100.0%
Sugar	98.5%	96.4%	100.0%
Cocoa	100.0%	90.0%	99.7%
Coffee	100.0%	35.0%	98.4%

Short-Term Inflation Expectations

Many traders look at commodities in general as a hedge against inflation. If we map the returns of each commodity against the TIPS inflation note on an inverse scale, we do in fact see commodity prices rise as a function of rising inflation expectations in all cases except – and this is delicious – for gold and silver in Period 1.

Comparative Correlation: Commodities Vs. Five-Year TIPS Breakeven

How did the regressions change from period to period? They did not for nickel and platinum between Periods 1 and 2. The list expanded to silver, palladium, tin, nickel, KC wheat, corn and coffee between Periods 2 and 3.
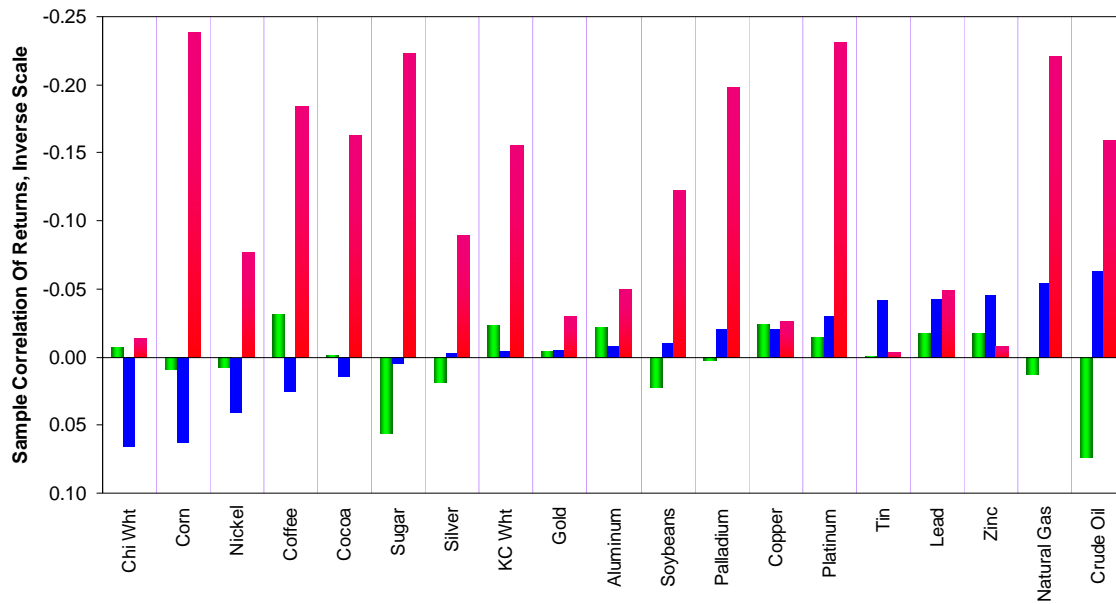
Probabilities Regressions Are Different

Against TIPS	Period 1: Period 2	Period 2: Period 3	Period 1: Period 3:
Gold	100.0%	100.0%	100.0%
Silver	100.0%	42.8%	100.0%
Platinum	74.0%	100.0%	100.0%
Palladium	96.9%	30.7%	72.5%
Crude Oil	100.0%	99.5%	92.0%
Natural Gas	100.0%	100.0%	100.0%
Copper	100.0%	99.4%	99.7%
Aluminum	100.0%	81.5%	99.9%
Lead	100.0%	99.9%	100.0%
Tin	100.0%	25.4%	100.0%
Zinc	100.0%	96.2%	100.0%
Nickel	53.5%	61.7%	28.8%
KC Wht	100.0%	56.1%	100.0%
Chi Wht	98.4%	100.0%	100.0%
Soybeans	100.0%	100.0%	78.3%
Corn	100.0%	44.4%	100.0%
Sugar	99.3%	93.3%	100.0%
Cocoa	100.0%	98.4%	96.5%
Coffee	100.0%	25.5%	98.8%

Repo Rates

Now let's complete the analysis by mapping the correlations of commodities against the repo bill on an inverse scale. The collapse in short-term interest rates after October 2007 should have affected the relationships, and it did, at least visually.

Comparative Correlation: Commodities Vs. Three-Month Repo

The list of which regressions different between Periods 1 and 2 was confined to nickel. Between Periods 2 and 3, the list expanded to include silver, palladium, aluminum, tin, nickel, KC wheat, corn and coffee.

Probabilities Regressions Are Different

Against Repo	Period 1: Period 2	Period 2: Period 3	Period 1: Period 3:
Gold	100.0%	99.9%	100.0%
Silver	100.0%	13.6%	100.0%
Platinum	88.2%	100.0%	100.0%
Palladium	86.1%	3.7%	66.9%
Crude Oil	100.0%	96.4%	71.2%
Natural Gas	100.0%	100.0%	100.0%
Copper	100.0%	99.2%	99.9%
Aluminum	100.0%	58.6%	100.0%
Lead	100.0%	100.0%	100.0%
Tin	100.0%	23.5%	100.0%
Zinc	100.0%	96.7%	100.0%
Nickel	52.4%	35.5%	2.6%
KC Wht	100.0%	45.1%	100.0%
Chi Wht	98.5%	100.0%	100.0%
Soybeans	100.0%	100.0%	86.4%
Corn	100.0%	66.1%	100.0%
Sugar	99.2%	87.3%	99.9%
Cocoa	100.0%	98.3%	96.3%
Coffee	100.0%	38.8%	98.0%

Investment Implications
We are left with an interesting set of conclusions. First, the list of commodities whose behavior did not change between Periods 2 and 3 includes precious metals along with the wheat markets, sugar, coffee, copper, aluminum

and both crude oil and natural gas. Yet the urban legend of the post-August 2007 period is monetary policy changed the behavior of "commodities" in general.

Second, while rising Chinese demand and the revaluation of the yuan are easy to blame for rising commodity prices, the accelerated revaluation commencing in October 2007 did not affect a wide swath of commodities, including important industrial metals such as aluminum and nickel.

Third, while it is easy to make a short-term correlation between crude oil prices and the euro, the common currency's impact after October 2007 was not significant for either crude oil or gold.

Finally, while the drop in short-term interest rates after October 2007 gets blamed for commodity inflation, it was not significant for important markets such as silver, palladium, aluminum, tin, nickel or corn. And is it reasonable to attribute the jump in certain agricultural commodities such as soybeans, wheat, sugar and cocoa to lower short-term interest rates? That is a tough argument to make. We can ask the same questions for TIPS breakeven rates of inflation.

The uneven and erratic contribution of financial factors to commodity prices from one market regime to the next underscores, once again, the need to pay attention first and foremost to each individual commodity's fundamental market conditions. No matter how much we index commodity markets or get broadsided by broad changes in currency and interest rate markets, nothing takes the place of treating each market differently.

This may be unwelcome to those who prefer the simplicity of each of trading a broad index. So what? If you want to trade gold or soybeans or crude oil, trade them. But do yourself a favor and keep other markets out of the analysis unless you can prove they are statistically causal.