Commodities: Diversification Returns

Historically, commodities have been good diversifiers to both equities and bonds. During the past several years, however, questions were raised about the diversification potential of commodities as correlations between commodities and other asset classes increased substantially. Several observers attributed this rise in correlations to the “financialization” of commodity markets, a term used to describe the increase in institutional and retail investment flows into commodities starting in the mid 2000s.\(^1\) Recently, correlations between commodities and other asset classes have dropped back down to their historically normal near zero levels, even as investment in commodity markets has hit all time highs. This behavior is unexplainable by the financialization hypothesis. As presented in this paper, a simpler explanation for the rise and subsequent fall in correlations is the boom and subsequent bust of the Global Financial Crisis as many asset markets – commodities being just one – experienced transitory and extreme rises in correlations within themselves and amongst each other. With this crisis period now over, we show that the influence of macro-economic factors on commodity markets has also subsided allowing fundamental drivers to regain their historical importance and allowing commodities to regain their diversification potential. Finally, we discuss the implications that this revival of diversification has for investors not only for allocations to traditional commodity indices but, more importantly, for allocations to more diversified commodity portfolios, as well as for active commodity programs.

**Commodities and Diversification**

Asset markets of all types are influenced by multiple factors which wax and wane through time. For example, equities are influenced by both economic growth and investors’ risk aversion and bonds are influenced by both cost of capital considerations and investors’ flight to safety response in times of market stress. Influences on assets become more or less important at different points in time. For example, in times of market stress, risk aversion and flight to safety influences on equities and bonds dominate; whereas in times of economic expansion, economic growth and cost of capital factors dominate.\(^2\) Commodities are no different. They too have multiple influences, the two most basic of which are supply and demand. Changes in the fundamental supply and demand of commodities through time are what generally cause commodities to behave independently from equities and bonds. The physical fundamentals of commodities generally have nonexistent or only
weak relationships to the ability of companies to generate profits (an equity driver) or the cost of capital (a bond driver). It would be hard to conceive of a strong economic rationale to link the price of wheat (or butter production in Bangladesh) to the prices of the S&P 500 or a 10-Year Treasury Bond.

During the end of the 2000s and beginning of the 2010s, we saw a large increase in the correlations between commodities and other assets, however. The following chart shows the average rolling 60-day correlations between all commodity sectors and between commodities and a handful of other asset classes from the early 1990s to present. Over most of the history, the chart shows that commodities have been a strong diversifier to equity, bond, and currency markets, as well as to each other. From 2007 to 2012, however, correlations increased well past their historically normal low levels.

There are two competing theories as to what caused the correlation increase: commodity “financialization” or the Global Financial Crisis. The theories disagree in their transmission mechanisms and implications for the future, but they do agree on two very important points, namely that commodities are naturally diversifying and something caused that behavior to change. Ultimately, whether “the thing” that changed is long lasting or was transitory is the critical question for investors to ask since the answer will govern whether to expect commodities to maintain their renewed diversifying status going forward or not. Using the most current data, we will show that the evidence more strongly supports the view that it was the boom and bust of the Global Financial Crisis that caused higher, transitory correlations, rather than that the increased institutional and retail commodity investment will sustain high correlations as argued by financialization proponents.

Financialization of Commodities
The argument for financialization states that as institutions and retail investors invested more and more into commodities since the mid-2000s, commodities became more correlated to external markets, as well as to each other, because institutions and retail investors made commodity investments in parallel with their investments in other asset classes. To be sure, there has indeed been a surge in commodity investment since the mid-2000s. Exhibit 2 shows the average growth in aggregate investment across a wide range of

**EXHIBIT 1: ROLLING CORRELATIONS BETWEEN COMMODITY SECTORS AND COMMODITIES WITH OTHER ASSET CLASSES**
(April 1991 - February 2014)

Sources: Bloomberg, CRB, Federal Reserve Economic Data.
US commodity markets. Note that the y-axis is logarithmic, i.e. growth in the past 30 years has expanded an impressive 30 times with the most explosive growth occurring in the mid-2000s. It is exactly this period of explosive growth that followers of the financialization argument point to as evidence.

**EXHIBIT 2: COMMODITY FUTURES DOLLAR OPEN INTEREST**
(January 1986 - February 2014)

This growth in commodity investment does not show what types of investors drove the growth, but there is a companion data set produced by the Commodity Futures Trading Commission (CFTC) that disaggregates the trading activity of different commodity market participants. The CFTC divides market participants into two broad categories, hedgers and non-hedgers. Hedgers are defined as investors whose core business activity is hedged by their commodity trading. An example of a hedger is the oil producer Exxon which can hedge their business activity by trading oil. Non-hedgers include corporate and public pensions, investment managers, and ETF/ETP/ETN providers whose core business activity is not related to commodities. This group of non-hedger market participants are thus the “institutional and retail investors” invoked in the financialization argument. The chart below shows the percentage of non-hedger investments as a proportion of the total over time, and we can see that it has grown from near 10% in the mid-1980s to near 25% today.

**EXHIBIT 3: NON-HEDGER’S SHARE OF COMMODITY MARKETS OVER TIME**
(January 1986 - February 2014)

Sources: US Commodity Futures Trading Commission, First Quadrant, L.P.

Taken together, this data raises a handful of questions for the financialization argument:

1. Since 2010 commodity correlations have declined and have now reached effectively zero even as commodity investment has climbed to new all time highs. If financialization was the cause of higher correlations, why would its influence have stopped right when financialization hit its peak?
2. The liquidity crisis of 2008 is clearly visible in the commodity investment data above, but this also corresponded to the peak of commodity correlations. If financialization was the cause of higher correlations, shouldn’t a decline in financialization lead to a decline and not a rise in correlations?
3. The large rise in aggregate commodity investment in the mid-2000s corresponded to a leveling off of the proportion of non-hedger (i.e. institutional and retail investor) activity in the markets. In other words, both hedgers and non-hedgers contributed equally to the large
rise in commodity investment in the mid-2000s. If financialization was the cause of higher correlations, shouldn’t we have seen a disproportionate increase in the activity of non-hedgers, i.e. institutional and retail investors?

4. The very recent spike up in non-hedger activity corresponds exactly to the period where correlations of commodities dropped from their highs back down to zero. If financialization was the cause of higher correlations, shouldn’t the recent spike up in non-hedger investment have caused even greater correlations, not a drop back to zero?

5. The data shows that the significant rise in commodity investment started in 2002, but it wasn’t until 2007 that commodity correlations increased past their historical ranges. Why was there a five year delay in the effects of financialization on these correlations?

There may, indeed, be answers to these questions that could still allow a financialization argument to hold water, but answering these questions would require complicating the argument with special cases or conditional conclusions. In other words, given the data we see in the previous charts, we would have to blunt our Occam’s Razor considerably to continue to follow the financialization argument.

The Global Financial Crisis and Commodities

The main alternative argument for what caused these increased correlations is the Global Financial Crisis. In particular, without invoking a new and dominating influence of institutional and retail investment, one can explain the increased correlations due to physical demand for commodities falling at the same time that risk aversion increased. It is well documented that the Global Financial Crisis corresponded to the largest reduction in real economic activity since the Great Depression, and reduced economic activity by its nature corresponds to reduced demand for goods and services. The scale of the reduction in economic activity was unprecedented in modern times and so, arguably, affected demand for most consumptive goods like commodities. There is also no doubt that risk aversion increased significantly during the Global Financial Crisis. Two readily available examples are the significant rise in the price of hedging equity portfolios shown by the VIX\(^5\) hitting all-time highs, and the large increase in the price at which investors provided credit to corporations shown by corporate credit spreads\(^6\) reaching all-time highs. Simply put, the significant increase in commodity correlations can be described by the simultaneous occurrence of natural price drivers taken to extremes.

There are also questions for the Global Financial Crisis argument that come with our data:

1. Are the current near zero correlations an exception to a new rule rather than a return to an old rule?

If they are an exception to a new rule, such as financialization, one would expect that the risk aversion and macroeconomic influences during the Global Financial Crisis should also henceforth affect commodities. Although macroeconomic data is mostly reported with a coarse granularity and with a delay, there are some data sets we can employ to investigate this question now rather than waiting the years it will take to have the data necessary to complete a thorough analysis. The chart below shows the average rolling 60-day correlations, from the early 1990s to present, between each commodity sector and a handful of indicators related either to risk aversion or macroeconomic health.

What we see is that the correlations between commodities and macroeconomic and risk aversion indicators also corresponded to the period of the Global Financial Crisis, were also transitory, and have also subsided back to their historically normal near zero levels. This data is not consistent with the view that commodities
should now be influenced by similar drivers as equities and bonds as they would be under the financialization argument. Instead, this data can be much more easily explained by the transitory and concurrent influences of the Global Financial Crisis on all asset classes. There is no new rule here, the drop in correlations is a return to an old rule.

2. A second question we can raise to challenge the Global Financial Crisis argument is: Why did the elevated correlations persist for a full five years before reverting?

In fact, if we take a close look at the data, correlations did start to decrease after the 2008 and 2009 time period, but the eruption of the European sovereign debt crisis in 2010 and 2011 caused correlations to push back out and remain heightened until the panic caused by the debt crisis passed. Arguably, the Global Financial Crisis includes not only the banking crisis originating in the US in 2008, but also the sovereign debt crisis in Europe. Regardless, these two crises were so close to each other that market correlations did not have ample time to subside to their normal levels in between them.

**What Does This Renewed Diversification Mean for Commodity Investors?**

Finally, let us discuss the implications of this renewed diversification for commodity investors. There are two main groups of investors for us to consider: passive investors and active investors. Passive investors sub-divide further into traditional commodity index investors and a growing group of investors strategically allocating to more diversified commodity portfolios. For traditional commodity index investors, the high correlations during the crisis period caused a reduction in the diversification potential of commodities. As one of the key reasons to invest in any asset class is to diversify an investor’s portfolio, this reduction in diversification potential created a rational pause for commodity investors. With the crisis driven correlations passed, commodities have

**EXHIBIT 4: ROLLING CORRELATIONS OF COMMODITIES WITH MACRO AND RISK INDICATORS**

(January 1991 - February 2014)

Sources: Bloomberg, CRB, First Quadrant, LP. Credit Spread is the difference in yield between Barclay’s High Yield Bond Index and Barclay’s Investment Grade Corporate Bond Index, Term Spread is the difference in yield between 10-year and 2-year Treasuries, and Inflation Breakeven is the difference in yield between TIPS and Treasuries.
Commodities regained their diversification potential. Adding an appropriately sized allocation to commodities should again provide the return versus risk enhancement that diversification naturally brings.

A sub-group of passive investors benefitting even more from this renewed diversification are those that allocate to portfolios strategically constructed to capture the diversification inherent in the commodity asset class. This group differs from the index group in that rather than simply accepting the energy-heavy sector allocations provided by the traditional commodity indices, they recognize the potential diversification benefits that can be captured within the commodity markets themselves. Commodities are unlike other asset classes in that correlations amongst commodity sectors are very weak. Contrary to other asset classes, which often have a strong common price driver such as economic growth in the case of equities or the cost of capital in the case of bonds, commodities share no such common price driver from a fundamental standpoint. There is no economic reason to think that the supply/demand forces for wheat, for example, would have much, if anything, in common with the supply/demand forces for copper. The chart below shows the average correlation between sectors over time for equity, bond, and commodity sectors, and we can see that indeed, other than the Global Financial Crisis period, equity and bond markets are universally more correlated than commodity markets.

Below is another visualization of this low cross-sector correlation in commodities using a heat map to present correlations amongst 28 sectors.
individual commodities as 378 unique pairs. What we see is that the commodity sectors clearly stand out as more correlated subsets against a backdrop of effectively no correlation between the sectors.

The low correlations within the commodity asset class can be taken advantage of by passive investors simply by diversifying a commodity portfolio across the different sectors. A simple way of achieving a diversified exposure is to take a risk parity approach. Balancing risk rather than capital allocation across commodities is critical to achieving true diversification in commodities since the risk of different commodities varies widely from 40% for natural gas to 15% for live cattle. While sector-to-sector commodity correlations were also heightened by the Global Financial Crisis, as we saw, the drop in those correlations back to their near zero historical norms presents renewed opportunity for the benefits of a diversified approach, such as a balanced risk approach, to commodity markets.

The second major group of investors that benefit from this renewed diversification are active commodity investors. In order to generate alpha, long/short investors need markets to move independently. This fact goes back to the Fundamental Law of Active Management developed by Richard Grinold and Ronald Kahn. The Fundamental Law states:

$$IR = IC \sqrt{Breadth}$$

Where IR is the risk-adjusted return that can be generated, IC is the manager’s skill (defined as the correlation between a manager’s forecast returns and the market’s realized returns), and Breadth is the number of independent bets placed. Breadth is not simply equal to the number of assets in an investor’s universe, however, as it relies critically on the independence of those assets. If two assets are correlated, the effective breadth of a portfolio that places a bet on each of them is less than two, and in the extreme of perfect correlations, the effective breadth of a two asset portfolio is in fact just one. Richard Grinold and Mark Taylor derived an expression for this effective breadth in a follow-on analysis to the Fundamental Law. They showed that:

$$Effective \ Breadth \propto r^T \Sigma^{-1} r$$

Where $r$ is a vector of market returns, and $\Sigma$ is the covariance matrix of market returns. Grinold and Taylor explicitly derived their formula in an ex-post context, however. In other words, their expression shows the effective breadth that was available to long/short investors in the past, not the breadth that is available to long/short investors in the future. Since investors care most about the forward looking context of course, we need to make a slight adjustment to the expression assuming we do not, in general, know what future market returns will be. If we make the assumption that the magnitude of an asset’s returns will be proportional to an asset’s risk, and that the risk-adjusted return generating potential of all assets is the same for a long/short investor, the above expression simplifies to:

$$Effective \ Breadth \propto 1^T C^{-1} 1$$

Where $C$ is the correlation matrix.

This formula shows that the returns available to long/short investors in the future are inversely proportional to the correlations amongst the markets invested. This is a very intuitive result: as correlations go up, the opportunity for returns to long/short investors goes down.

Using this expression, the chart (next page) shows the effective breadth across 28 commodity markets over time (up to the proportionality constant). We can see that the period of the Global Financial Crisis corresponds to the least breadth that has ever existed in commodity markets, and correspondingly, the least opportunity long/short commodity investors ever faced to generate returns. In fact, for a universe of 28 commodities, the effective breadth fell below 5 during the period of the Global Financial Crisis!

The chart also shows that the effective breadth in commodity markets has returned back to its long run average level of 16 (the red line) after 5 years of being well below it. In other words, with the subsidence in correlations, the opportunity
available for active investors to generate alpha has also returned.

**EXHIBIT 7: EFFECTIVE BREADTH AVAILABLE TO LONG/SHORT COMMODITY INVESTORS**
(January 1990 - February 2014)

Sources: Commodity Research Bureau, First Quadrant, L.P.

**Conclusion**

In this paper, we discussed the transitory breakdown of the diversifying nature of commodities relative to three major assets classes as well as within the asset class itself. We pit two competing theories against each other as to the cause of this breakdown: the financialization of commodities or the Global Financial Crisis. While both theories are plausible, the recent trend of commodity correlations back to their long run levels near zero weakens the argument for financialization and strengthens the argument for the Global Financial Crisis as the more likely culprit. The implications of this outcome are critical for investors. Whereas financialization would have implied a permanent degradation of the diversification potential of commodities, the transitory nature of the Global Financial Crisis implies that this degradation of diversification was itself transitory as well. We showed that the correlations between commodities and other asset classes have returned to near zero, that the correlations between commodity sectors themselves have returned to near zero, and that the correlations of commodities to macroeconomic influences have returned to near zero as well, all while institutional and retail investment in commodities has hit new all time highs. This analysis points to the conclusion that commodities have reconnected with their fundamental supply/demand influences and have thus regained their naturally diversifying nature. As a manager of commodity strategies that span the passive to active spectrum, this understanding allows us to better gauge how various market influences impact the different types of commodity strategies we manage, as well as how they ultimately impact the portfolios of those who choose to invest with us.

**Endnotes**


2 First Quadrant has written about this before in “Did Diversification Fail?” by Max Darnell in our 2009 perspectives.

3 A now infamous example that shows the perils of data mining for price relationships without economic rationale showed that butter production in Bangladesh explained the variability of the S&P 500 with an impressively high R^2 of 0.75 from 1981 to 1993. This example was produced in 1995 by David Leinweber in a paper called Stupid Data Miner Tricks: Overfitting the S&P 500. David Leinweber was a researcher at First Quadrant at the time.

4 Occam’s Razor is the principle that simpler explanations are often better explanations.

5 The Chicago Board Options Exchange (CBOE) Volatility Index (VIX) shows the market’s expectation of 30-day volatility. It is constructed using the implied volatilities of a wide range of S&P 500 index options. This volatility is meant to be forward looking and is calculated from both calls and puts. The VIX is a widely used measure of market risk and is often referred to as the “investor fear gauge.”

6 Spread between Corporate Bonds and Treasury Bonds.

7 Active Portfolio Management by Richard Grinold and Ronald Kahn.


9 Although the correlations still must be estimated, likely by using historical data, meaningful changes in correlations generally occur quite slowly. We can see this in the charts of correlations over time above.