CBD Price Correlations and Volatility

Overview

Seed CX recently released the first iteration of its CBD price index[1] and with it the first data set on CBD prices. This new and exciting data set will help producers, hedgers, and traders look and how CBD behaves relative to other commodities and determine where it can fit within their portfolio. This report provides several different looks at CBD market behaviors relative to other widely traded commodities.

Data

The data set includes monthly values of the CBD price index and monthly average prices for five other widely traded agricultural commodities[2]. Table 1 shows these values for the chosen time period of July 2015 to August 2016.

Table 1: Monthly Average Price

		CBD Index Value	Corn Price ($)	Soybeans Price ($)	Oats Price($)	Wheat Price ($)	Canola Price ($)
2015	Jul	100.00	3.8	9.95	2.33	5.23	18.1
	Aug	105.52	3.68	9.71	2.07	4.84	15.6
	Sep	107.89	3.68	9.05	2.04	4.72	15.1
	Oct	109.62	3.67	8.81	2.2	4.86	14.8
	Nov	106.37	3.59	8.68	2.11	4.86	15.1
	Dec	103.46	3.65	8.76	2.12	4.75	14.9
2016	Jan	95.31	3.66	8.71	1.93	4.82	13.8
	Feb	93.26	3.58	8.51	2.21	4.61	15.3
	Mar	85.55	3.56	8.56	2.2	4.4	15.1
	Apr	85.70	3.56	9.01	1.97	4.46	16.1
	May	72.54	3.68	9.76	2.26	4.45	16.7
	Jun	77.16	3.82	10.2	1.98	4.2	18.8
	Jul	82.80	3.6	10.2	1.89	3.75	16.6
	Aug	70.55	3.21	9.93	1.84	3.67	15.8

Price Correlations

This new price data set allows for the investigation of movements in the price of CBD in relation to other commodities. Table 1 provides an overview of the monthly price correlation between CBD and other, more traditional agricultural commodities from July 2015 to August 2016.

Table 2: Price Correlation

	CBD	*Corn*	*Soybeans*	*Oats*	*Wheat*	*Canola*
CBD	**1**					
Corn	**0.383555**	1				
Soybeans	**-0.50502**	0.089437	1			
Oats	**0.334398**	0.471368	-0.26738	1		
Wheat	**0.786419**	0.600673	-0.45039	0.66422	1	
Canola	**-0.42566**	0.349732	0.780264	0.038183	-0.2018	1

[1] More information regarding the construction of this index can be found at http://seedcx.com/docs/CBD_Price_Index.pdf
[2] Price data for corn, soybeans, wheat, oats, and canola obtain from USDA National Agricultural Statistics Service at https://quickstats.nass.usda.gov/

The price of CBD is strongly and positively correlated with wheat (0.79) and moderately positively correlated with both corn (0.38) and oats (0.33). CBD is negatively correlated with soybeans (-0.51) and canola(-0.43).

While this provides an overview of the correlation of nominal price, correlations between price returns may be more appropriate in certain circumstances. Table 3 provides an overview of the correlation between price returns for these commodities.

Table 3: Price Return Correlations

	CBD Returns	*Corn Returns*	*Soybeans Returns*	*Oats Return*	*Wheat Returns*	*Canola Returns*
CBD Returns	**1**					
Corn Returns	**0.127767482**	1				
Soybeans Returns	**-0.234249328**	0.497064752	1			
Oats Return	**-0.426485762**	0.103984958	0.031788572	1		
Wheat Returns	**-0.460903464**	0.291864609	0.101463545	0.219430394	1	
Canola Returns	**-0.070281604**	0.489210543	0.443128181	0.26905021	0.274037037	1

When looking at price returns, CBD behaves differently. Nearly all the other commodities exhibit negative price return correlations with CBD. Oats (-0.43) and wheat (-0.46) display the strongest of these negative correlations and corn (0.13) showing a weak positive correlation.

Price Volatility

Measures of volatility can help show just how much the price of a given commodity typically moves over a given period. Standard deviation of price returns can help illustrate volatility as is show just how much a price typically moves over time and is comparable across commodities and units of measure. Table 4 provides a breakdown of the price returns and the standard deviation of these returns

Table 4: Volatility of Price Returns

		CBD Index Return	Corn Return	Soybeans Return	Oats Return	Wheat Return	Canola Return
2015	Jul						
	Aug	5.52%	-3.16%	-2.41%	-11.16%	-7.46%	-13.81%
	Sep	2.25%	0.00%	-6.80%	-1.45%	-2.48%	-3.21%
	Oct	1.60%	-0.27%	-2.65%	7.84%	2.97%	-1.99%
	Nov	-2.97%	-2.18%	-1.48%	-4.09%	0.00%	2.03%
	Dec	-2.74%	1.67%	0.92%	0.47%	-2.26%	-1.32%
2016	Jan	-7.87%	0.27%	-0.57%	-8.96%	1.47%	-7.38%
	Feb	-2.16%	-2.19%	-2.30%	14.51%	-4.36%	10.87%
	Mar	-8.26%	-0.56%	0.59%	-0.45%	-4.56%	-1.31%
	Apr	0.18%	0.00%	5.26%	-10.45%	1.36%	6.62%
	May	-15.36%	3.37%	8.32%	14.72%	-0.22%	3.42%
	Jun	6.36%	3.80%	4.51%	-12.39%	-5.62%	12.91%
	Jul	7.31%	-5.76%	0.00%	-4.55%	-10.71%	-11.70%
	Aug	-14.79%	-10.83%	-2.65%	-2.65%	-2.13%	-4.82%
Standard Devation		**7.44%**	**3.87%**	**4.00%**	**9.02%**	**3.89%**	**7.96%**

With a standard deviation of price returns of 7.44%, CBD display similar volatility characteristics to Canola (7.96%). This is less volatile than oats (9.02%) but shows much more volatility than corn (3.87%) soybeans (4.00%) and wheat (3.89%).

Beta

While comparing measures of volatility across different commodities can help gain an understanding of how volatile these commodities are in relation to each other, it does not tell how volatile a commodity is relative to the market as a whole. One way to measure the volatility of an asset is using beta. Beta is a numeric value that measures the volatility of an asset, whether that be a stock or commodity, relative to the overall market.

The Goldman Sach Commodity Index (GSCI)[3] serves as a benchmark of investment in the commodity markets and as a measure of commodity performance over time. This measure can be used to compare the volatility of the CBD market to the overall commodity market. Table 5 provides a look into the value of the CBD price index and the GSCI over the specified period as well as returns.

Table 5: Monthly Price Returns

		CBD Price Index		GSCI	
		Value	Return	Value	Return
2015	Jul	100		402.7582	
	Aug	105.52	5.5159%	360.8514	-10.4049%
	Sep	107.89	2.2523%	362.5171	0.4616%
	Oct	109.62	1.6031%	364.4614	0.5363%
	Nov	106.37	-2.9660%	345.9145	-5.0888%
	Dec	103.46	-2.7373%	316.2973	-8.5620%
2016	Jan	95.314	-7.8730%	290.2011	-8.2505%
	Feb	93.256	-2.1587%	293.46	1.1230%
	Mar	85.553	-8.2596%	325.0795	10.7747%
	Apr	85.704	0.1757%	337.7943	3.9113%
	May	72.543	-15.3563%	361.3252	6.9661%
	Jun	77.158	6.3623%	377.1136	4.3696%
	Jul	82.797	7.3076%	354.9555	-5.8757%
	Aug	70.55	-14.7913%	353.4517	-0.4236%

Using the information from Table 5, the beta for the CBD market can be established using simple linear regression[4]. This method results in an estimation of the beta in the CBD market of -0.365 with a standard error of 0.329 and R^2 of only 0.101. While the results may not be significant it may give some kind of indication that the CBD market is relatively less volatile than the overall commodities market.

Comparison to GSCI – investment opportunity

Comparing the GSCI to CBD can also help investors get a better understanding as to the type of risk exposure they are gaining when dealing with CBD. Since GSCI is comprised of 24 different commodities, it captures most of the market dynamics and risk exposures present within them. However, it does capture every risk profile. Perhaps CBD can provide investors to a certain type of risk exposure that these traditional commodities cannot capture. In order to investigate the risk exposure within the CBD market compared the general commodities markets, the correlation between the GSCI and the CBD index is calculated, with a value of (-0.03) the CBD market is mostly uncorrelated with the GSCI and traditional agricultural commodities. Therefore, it may possess different levels or types of risk exposure that certain investors may be interested in.

[3] The S&P GSCI® is a composite index of commodity sector returns representing an unleveraged, long-only investment in commodity futures that is broadly diversified across the spectrum of commodities. The returns are calculated on a fully collateralized basis with full reinvestment. The combination of these attributes provides investors with a representative and realistic picture of realizable returns attainable in the commodities markets.
[4] Estimates are established using OLS regression of CBD price index on the GSCI

Comparing Contract Specs

Futures contract specifications for these six commodities can help in the comparison of CBD to other, widely traded agricultural commodities. Table 6 provides a comparison of the of the minimum price fluctuation (tick) per contract as well as the notional value of the contract[5] of the current contracts.

Table 6: Contract Spec Comparison

	CBD[6]	Corn[7]	Soybeans[8]	Oats[9]	Wheat[10]	Canola[11]
Per Contract	5	12.5	12.5	12.5	12.5	2
Notional Value	12500	17700	50050	11250	20850	103.2
%	0.040000%	0.070621%	0.024975%	0.111111%	0.059952%	1.937984%

When comparing the tick size per contract as a percentage of the notional value, CBD (0.04%) currently falls with the range of corn futures contracts (0.07%), soybean futures contracts (0.02%), oats futures contracts (0.11%), and wheat futures contracts (0.05%). Only canola futures contracts (1.94%) are substantially larger.

Conclusion

CBD prices show similar characteristics to other traditional commodities through correlations and volatility. Given these characteristics, CBD may represent a unique way for producers, investors, and traders to expand their portfolio.

[5] Notional value calculated using closing prices for 11/8/2016 multiplied by the contract size.
[6] CBD futures contract specs obtained from Seed CX http://seedcx.com/docs/CBD_Contract_Addendum.pdf
[7] Corn futures contract specs obtained from CME https://www.cmegroup.com/trading/agricultural/grain-and-oilseed/corn_contract_specifications.html
[8] Soybean futures contract specs obtained from CME https://www.cmegroup.com/trading/agricultural/grain-and-oilseed/soybean_contract_specifications.html
[9] Oats futures contract specs obtained from CME https://www.cmegroup.com/trading/agricultural/grain-and-oilseed/oats_contract_specifications.html
[10] Wheat futures contract specs obtained from CME https://www.cmegroup.com/trading/agricultural/grain-and-oilseed/kc-wheat_contract_specifications.html
[11] Canola futures contract specs obtained from ICE https://www.theice.com/products/251/Canola-Futures