Is Crude Oil Really A Currency-Driven Commodity?

One of the stranger aspects of sharp crude oil price movements, both higher and lower, is how someone will link the declines to a stronger dollar and the rallies to a weaker dollar and walk away without providing any evidence for this assertion or having to face any skeptical questioning. The assumption, accepted as one of those truths we should hold self-evident, is since crude oil is priced in USD a higher dollar will make crude oil imports more expensive for non-USD buyers and vice-versa.

This argument used to be compelling for a static asset such as gold where production is limited and where actual consumption is a small fraction of demand. The idea was an increased supply of paper money chasing a limited supply of gold would be a good barometer for both expected inflation and for the relative purchasing power of the dollar or whatever currency you wished to use at the time. However, while gold is taken out of the ground to be reburied in vaults, crude oil is extracted, refined and consumed with only a relatively small portion stashed away in strategic inventory stockpiles. Moreover, its supply is anything but constant as forty-plus years of supply shocks, wars, embargoes, hurricanes and various other hissy fits and bad hair days have shown. Finally, our efficiency of using gold has changed little over the millennia, but our constant-dollar GDP per BTU ratio has been improving at nearly 2 percent per annum since the 1970s.

Return Paths Over Time

Now let's get on to the titular question of whether crude oil prices are currency-driven. First, let's stipulate there really is no perfect measure for "the dollar," only competing index measures (see "What's One More Dollar Index Between Friends?" June 2015). Here is where the unchanging weights of the ICE dollar index (DXY) come in handy. We can create a weighted index history of the carry return for borrowing the USD and lending into the six components (USD:DXY) very simply. Other indices with their changing weights will produce different net carry return indices, but these differences are surprisingly minor and do not deviate from the DXY in direction.

Second, there are a couple of glaring errors when we speak of "the dollar" and really mean some variation on the exchange rate against the EUR with a few other currencies tossed in there just to be sociable. China has been the fastest-growing consumer of crude oil for more than a decade and the CNY has been on an appreciation path against the USD since July 2005 with a few pauses and an engineered downturn in early 2014 interrupting its upward path. To exclude the impact of this growing importance of China in the world oil market and a currency still unresponsive to market forces in a two-way trade to focus on indices that include the Swiss franc and Swedish krona is almost willfully negligent. In addition, petroleum-producing countries of the Middle East, Saudi Arabia in particular, have been increasing consumption of crude oil very rapidly. The Saudi riyal is essentially pegged to the USD. Are we to ignore this region, too, to focus on liquid currencies only?

If we map this weighted carry return index against the Bloomberg total return indices for both Brent and WTI on common logarithmic scales, we have to wonder why anyone would consider the crude oil indices to be a strong function of the dollar index. The r-squared, or percentage of variance explained, for Brent and WTI by the USD:DXY carry return index for Brent and WTI since January 1999 have been 0.655 and 0.455, respectively.

The USD / Crude Oil Return Relationship



Correlation of Returns

Now let's rearrange the data in the chart above into a rolling three-month correlation of returns for the two crude oil series against the USD:DXY series. While your eyes may have told you Brent was strongly correlated to the USD:DXY series for long periods of time, the numbers say something entirely different. Not only has the correlation level never once exceeded 0.70, it was negative for long periods of time prior to 2003 and again in 2013-2015. Unsurprisingly, the correlation history for WTI against the USD:DXY series differs only marginally.



Simple visual inspection of the data involved should prompt some questions about whether a relationship should be supposed at all. Let's go back to the pre-2003 period when the USD was strengthening against a host of currencies, the EUR in particular as the good citizens of the Eurozone were scrambling to convert their unreported but taxable holdings from legacy currencies into USD. Crude oil returns rose strongly into late 2000 while the USD:DXY carry return fell.

The crude oil market then broke out to the upside in 2004 en route to its all-time high in July 2008. The USD:DXY carry fell into early 2006 and then rose sharply into 2008 as the U.S. moved to counter the gathering financial crisis with ever-looser monetary policy.

Finally, the post-crisis period saw an unexpected combination of a volatile USD:DXY carry return and relatively stable returns for Brent and especially for WTI. Narrations such as these should bring the presumption of a strong positive correlation between the USD:DXY carry and crude oil returns into question.

Prospective Crude Oil Returns

The spotty correlation record does not appear to be state-dependent; in other words, the relationship does not depend on whether this is a bull or bear market for either the USD:DXY carry return or for the crude oil total return indices. Let's see whether the USD:DXY carry return and the correlation level lead crude oil returns.

We can map three month-ahead returns for both the Brent and WTI indices as a function of these two variables. Positive returns are depicted with green bubbles, negative returns are depicted with red bubbles and the diameter of the bubbles corresponds to the absolute magnitude of the return. The last datum in the prospective return calculation, December 14, 2014, is highlighted, and the environment on the March 20, 2015 day of this writing is marked with a bombsight. The environment between December 2014 and March 2015 moved very sharply toward the northwest corner of the map as the USD:DXY carry return fell and as the correlation of returns between crude oil and the dollar rose.



Prospective Brent Returns As A Function Of USD And Correlation Of Returns To Brent

Prospective WTI Returns As A Function Of USD And Correlation Of Returns To WTI



In both cases a strong cluster of negative prospective returns is visible in the northeast corner of the maps corresponding to the combination of a weak USD and a correlation of returns greater than 0.45. One of these time

periods associated with this combination was the second quarter of 2008 when the dollar was weak, crude oil was at a record high and we were about to enter the financial crisis wherein both of these market conditions reversed violently. The second combination leading to negative three month-ahead returns for the crude oil indices occurred during the summer of 2011 just before the Federal Reserve commenced its Operation Twist. The dollar weakened and crude oil demand in the Eurozone turned down in a macroeconomic response to its sovereign debt crisis.

Causation And Intraday Linkage

Now let's conclude with a nod to two topics. First, we have to pose the question whether there is something called Granger Causation between crude oil and key currencies. Granger Causation is a surprisingly simple concept: X causes Y if past values of X improve the fit of Y against its own past values. The answer is simple as well: The USD:DXY carry does not Granger-cause either crude oil return series.

The second is whether you can find days when the crude oil markets and individual currencies, the euro in particular, appear to trade tick-for-tick with each other. The answer here is simple as well: Yes, those days exist, especially on days such as March 18, 2015 when the FOMC managed to trigger short-covering rallies in both markets simultaneously. So many traders are algorithmic now it would be highly unusual for this not to happen. After all, if you start losing profits on your short euro position, your portfolio risk-control program is likely to signal you to reduce positions elsewhere.

Instances such as these are anecdotal, though, not systematic. If you want to trade crude oil, trade crude oil; if you want to trade currencies, trade currencies. The principle of separate but equal has fallen out of favor elsewhere, but it applies here.