



Pairs trading: opportunities in oil

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IG Index

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Co-relating the price ratio between WTI and Brent Crude oil futures to generate low-risk profits in oil trading

Objective

This report highlights potentially favourable price conditions in the crude oil market. It aims to help you exploit the price co-relation between different crude oil futures using pairs trading as a strategy.

Readers unfamiliar with pairs trading should read our research article titled 'Equity pairs: a trading strategy' dated 1 January 2009.

Introduction

The price ratio analysis chart shown on the right illustrates a mean-reverting relationship between the price of March WTI (West Texas Intermediate) crude oil and March Brent Crude oil, which suggests that these two contracts may be suitable candidates for pairs trading.

I have calculated that 0.99 was the mean-average price ratio [1] of WTI and Brent Crude oil over the past year, and derived 0.977 and 1.006 as the levels reached before the price ratio reverted back to the mean of 0.99.

We can, therefore, consider 0.977 and 1.006 as potential entry levels, with a price ratio of 0.977 signalling a long WTI/short Brent opportunity and a price ratio of 1.006 indicating a short WTI/long Brent opportunity. A profit could be achieved by closing such trades whenever the price ratio starts to recalibrate back to the mean of 0.99, worked examples of which are given below:

Labels 1, 2, and 3 on the price ratio analysis chart represent periods when the WTI/Brent Crude oil price ratio deviated to the upper 1.006 entry level and lower 0.977 entry level.

Label 1 on the chart is our first entry point. For simplicity of analysis, I will assume a hypothetical \$1 per point (cent) position on WTI. It is crucial that both trades that make up the pair offer an equal exposure. As Brent was trading at a slightly higher level than WTI at this point, the size per point for Brent would need to be smaller than the \$1 per point placed on WTI in order to offer the same exposure.

The exposure to WTI is \$1/cent x 7190 cents = \$7190. To give an equal exposure to Brent we need to divide this by the price of Brent: $7190/7358 = 0.98$

We would, therefore, need to go short \$0.98 per point (cent) on Brent. Both theoretical trades would be placed on 23 July 2007 (the date of label 1). My calculation shows that this trade would have rendered a profit of \$88.32 (excluding transaction costs). See the calculation below:

Label 1	WTI	Brent	price ratio
	\$ per barrel	\$ per barrel	
23-Jul-07	\$71.90	\$73.58	0.977
01-Aug-07	\$72.49	\$73.28	0.99
Position	long	short	
per point size	\$1.00	\$0.98	
exposure	\$7,190	\$7,190	
difference	59	30	Total P&L
Profit or Loss	\$59.00	\$29.32	\$88.32

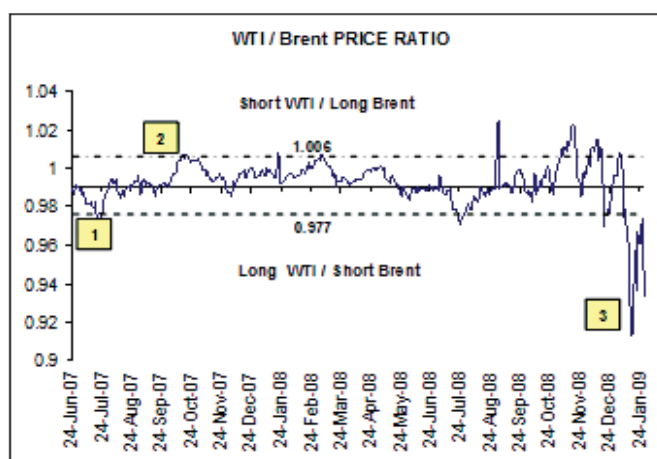
NB: March WTI and Brent prices are based on end-of-day closing prices. Prices sourced from Bloomberg.

Label 2 on the chart is another example of a pairs trading opportunity. This time it would have rendered a profit of \$105.56 (excluding transaction costs). Once again, the exposure of the Brent trade is equal to the exposure on the WTI trade at the outset.

Label 2	WTI	Brent	price ratio
	\$ per barrel	\$ per barrel	
15-Oct-07	\$77.92	\$77.43	1.006
14-Nov-07	\$84.12	\$84.64	0.99
Position	short	long	
per point size	\$1.00	\$1.01	
exposure	\$7,792	\$7,792	
difference	-620	721	Total P&L
Profit or Loss	-\$620.00	\$725.56	\$105.56

NB: March WTI and Brent prices are based on end-of-day closing prices. Prices sourced from Bloomberg.

Price ratio analysis



Raw data sourced from Bloomberg (27 January 2009). Crude prices represent end-of-day closing prices, with the exception being 28 January 2009, which is an intra-day price.

It is important to understand that pairs trading has its risks. The chart shows periods when the WTI/Brent price ratio deviated outside the 1.006 and 0.977 entry levels. A good example of this is illustrated by label 3, which shows the price ratio breaching the 0.977 entry level and touching a trough of 0.91317 on 15 January 2009. This means that a trader who had entered a pairs trade at the 0.977 entry level would currently be making a significant loss. They would also require additional capital to remain in the trade.

Significant deviations from the entry levels 1.006 and 0.977, as seen in label 3, have been infrequent over the past couple of years, however. During the last two years the lowest WTI/Brent price ratio (excluding the January 2009 data) was 0.969 and the highest was 1.033. [2]

Deviation in the WTI/Brent mean price ratio

The next question is: why was there such a significant deviation in the WTI/Brent mean price ratio? 'Under current conditions, WTI is less representative of supply and demand fundamentals outside of Cushing, Oklahoma (the main delivery point for WTI) than is usually the case,' said Craig Pirrong, a Finance Professor at the University of Houston. 'When conditions change, WTI may become more representative.' [3]

[1] Price Ratio: WTI \$ per barrel/Brent \$ per barrel

[2] The maximum and minimum WTI/Brent price ratios are based on end-of-day closing prices

[3] Forbes (26 January 2009)

WTI, which has historically traded at a slight premium to Brent, has been trading at a significant discount recently. WTI usually commands a premium over Brent because it factors in higher transportation costs and is considered to be of superior quality.

This anomaly is illustrated in label 3, and has occurred because WTI has been more sensitive to the larger-than-expected build up in US crude oil inventories, particularly at Cushing, Oklahoma. Meanwhile, Brent has been more sensitive to geopolitical tensions in the Middle East and Russia. This sheds some light as to why WTI has traded slightly below Brent and explains why the mean-average WTI/Brent price ratio has been equivalent to 0.99 over the past year and not above one, as a premium would naturally imply.

A recent report by Goldman Sachs explained that the factors currently contributing to a premium in the price of Brent are decreasing, suggesting that the historic price relationship between the two commodities may eventually be restored and that a pairs trading strategy is likely to be successful.

The dissipation of factors supportive of a wide premium in the Brent Crude contact over WTI – such as the escalation of the military conflict in Gaza and the Russia-Ukraine gas dispute – will leave Brent exposed to similar downside from increased oil inventories, its analysts said. [4]

Meanwhile, a separate report from Macquarie Group indicates that WTI oil prices will only recover from current levels once OPEC implements large scale production cuts of between 3-3.5 million barrels per day. Macquarie expects this development to start occurring in the second half of 2009. [5]

Macquarie's latest prognosis indicates the price of Brent Crude will average at \$59 a barrel in 2009. It also predicts that the price of WTI will average at \$60 a barrel this year. The fact that the bank is forecasting a premium to WTI indicates that the WTI/Brent price ratio is expected to narrow back to this year's mean-average of 0.99 eventually.

Entering a WTI/Brent pairs trade

Is it an appropriate time to enter a WTI/Brent pairs trade? I would be wary of entering a WTI/Brent pairs trade today: first, because the divergence in price ratio of the pair has a clear fundamental cause, rather than being an irrational discrepancy, and the 'anomaly' witnessed so far appears likely to continue for a while longer. Moreover, EIA crude oil inventories will probably continue rising in the coming weeks and this may have more of an impact on WTI than it will on Brent, as we have seen so far. For instance, the EIA recently surprised the market again by saying that crude oil stocks increased by 6.2 million barrels in the week that ended January 23. This was significantly higher than Bloomberg's expectations of a rise of 2.8 million barrels, and followed a 6.1 million rise the week before.

This development appeared to have more of an impact on WTI than on Brent - WTI's price was down by almost 3%

from its daily peak of \$42.45 to \$41.17 a barrel following the announcement, while the price of Brent Crude dropped 1.9% from its intraday high of \$45 a barrel to \$44.14 a barrel today.

I am confident that the price-ratio of WTI/Brent will eventually narrow towards this year's mean-average price ratio of 0.99. However, I am not convinced this will occur in the near future. I would take a step back and monitor market conditions for a while longer before making a decision. Having said that, the price ratio divergence is already very wide, so opportunistic traders expecting the WTI/Brent Crude price ratio to start narrowing could make a higher return by entering the trade sooner rather than later. Speculators believing that the WTI/Brent Crude price ratio will recalibrate back to the mean should go long March WTI and short March Brent.

Finally, remember that for a pairs trading strategy to work, your exposure to both commodities should always be the same - as I have shown in the two examples above.

At the time of writing, the price of March Brent Crude oil stood at \$44.14 a barrel while March WTI was trading at \$41.17 a barrel. This equates to price ratio of 0.9327, as shown in Table 1.

Table 1 – Price Ratio Data

Date	Brent Crude \$ / barrel	WTI Crude \$ / barrel	WTI/Brent Price ratio	Price ratio % change
29-Dec-08	43.2	43.03	0.996065	0.76%
30-Dec-08	42.92	42.76	0.996272	0.02%
31-Dec-08	48.82	48.59	0.995289	-0.10%
02-Jan-09	49.8	50.21	1.008233	1.30%
05-Jan-09	52.4	52.69	1.005534	-0.27%
06-Jan-09	53.27	53.13	0.997372	-0.81%
07-Jan-09	48.67	47.39	0.9737	-2.37%
08-Jan-09	47.55	46.51	0.978128	0.45%
09-Jan-09	47.24	46.07	0.975233	-0.30%
12-Jan-09	45.52	43.65	0.958919	-1.67%
13-Jan-09	47.44	44.77	0.943718	-1.59%
14-Jan-09	47.62	44.19	0.927971	-1.67%
15-Jan-09	47.68	43.54	0.913171	-1.59%
16-Jan-09	46.57	42.57	0.914108	0.10%
19-Jan-09	44.5	42.57	0.956629	4.65%
20-Jan-09	43.62	40.84	0.936268	-2.13%
21-Jan-09	45.02	43.55	0.967348	3.32%
22-Jan-09	45.39	43.67	0.962106	-0.54%
23-Jan-09	48.37	46.47	0.960719	-0.14%
26-Jan-09	46.96	45.73	0.973807	1.36%
27-Jan-09	43.73	41.58	0.950835	-2.36%
28-Jan-09	44.14	41.17	0.932714	-1.91%

Raw data sourced from Bloomberg (27 January 2009). Crude prices represent end-of-day closing prices, with the exception being 28 January 2009, which is an intra-day price.

[4] Dow Jones Newswires (19 January 2009)

[5] Reuters News (January 19 2009)

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