

22nd June 2009



Crude Oil & Natural gas Trade off

The report elaborates on the recent price gap between Crude oil and Natural gas (When Crude was trading 18.76 times higher the price of gas on 9th June 2009 compared to an 18 yr average of 9).It focuses on statistical, fundamental and technical analysis in coming out with a prediction on how the prices of both these commodities might move and thereby affect the price gap. In the latter part of the report a detailed investment strategy is laid out for investors wishing to profit from these current conditions.

Buy Natural gas	Sell Crude Oil
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Facts:

- Crude Oil, Gasoline, Heating Oil and Natural gas are all classified under energy commodities.
- Crude oil Future prices have *risen* by over 51% since Jan 2nd 2009 till now.
- RBOB (Reformulated Blendstock for Oxygenate Blending) Gasoline prices rose by 50%.
- Heating Oil prices rose by 13.4%.
- But, Natural gas Future prices have *fallen* by close to 34% in the same duration.

Price relationship between Crude Oil and Natural Gas

Crude oil and Natural Gas have several factors in common.

1. Both are Hydrocarbons.(Made of Carbon and Hydrogen atoms)
2. The source for extracting both these commodities is the same. Sometimes they can occur side by side inside the earth's crust.
3. Oil extraction occurs at shallow depths while Natural gas is available at deeper depths.

Changes in the Oil prices often affect gas prices but the same mechanism didn't work the other way round. This has to do with the size of individual markets. Oil prices are determined on the global market while gas market tends to be regionally segmented.

The prices of both the commodities are linked through the fundamentals of economics i.e., the laws of supply and demand, since both these commodities act as *substitutes* (a. Natural gas can substitute for crude oil or the products made from crude oil in the generation of electricity and Space cooling needs, b.CNG i.e., Compressed Natural gas can be used as a transportation fuel instead of gasoline or diesel) as well as rivals to each other in times of price volatility in the energy market. For instance high petroleum prices or low Natural gas prices make consumers substitute natural gas for petroleum products due to its inherently low price thereby increasing the demand and price of natural gas.

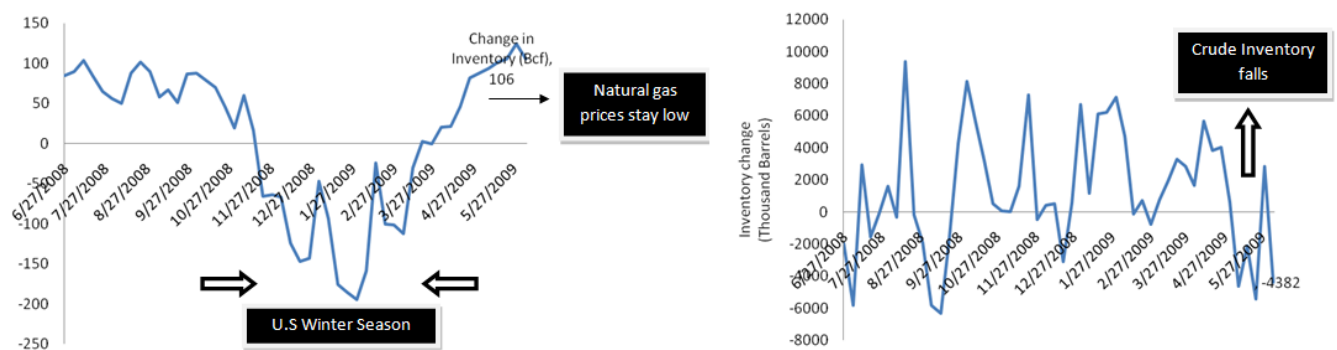
A common equation establishing the price stability in both these commodities was considered by taking the ratio of the prices of Oil and gas (referred to as *price ratio* from now on). The Price ratio for the previous 18 years stood at an average of 9.3.The practical significance of this figure comes into play when consumers wish to test the price gap between crude oil and gas.

However this ratio had been on a rise since March this year. In the current scenario this price gap i.e., crude trading 17 times the price of gas had almost doubled from the 18-yr average (see table below).

	Price ratio (Crude Oil price / Natural Gas price)
18 year period (04/1990 to 06/2009)	
18-yr average	9.2961
18-yr high	21.8803
18-yr low	2.6429
Monthly Avg in 2009	
January 09	7.91
February 09	8.57
March 09	11.42
April 09	13.33
May 09	15.07
1ST June 09 to 17th June 09	17.67
On 17th June 2009	16.7

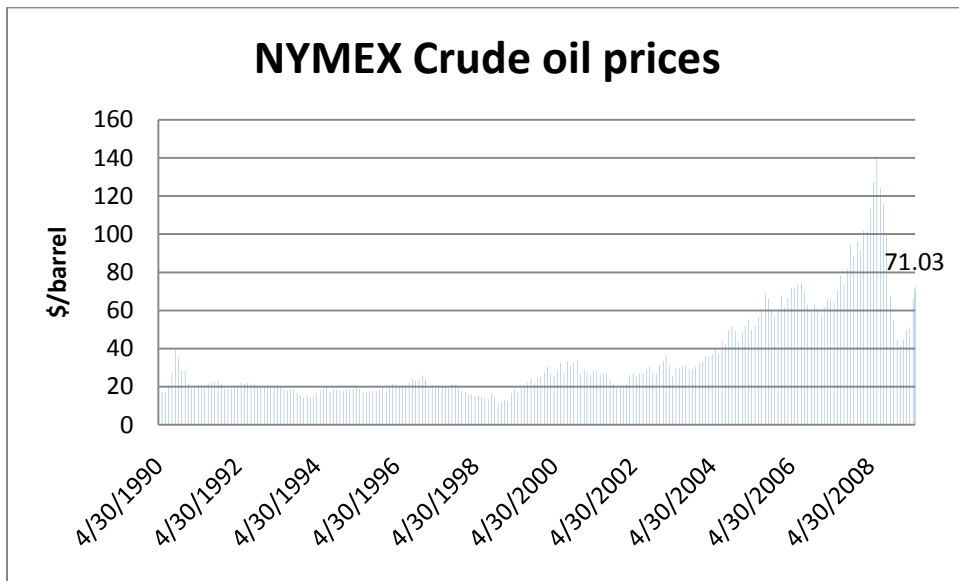
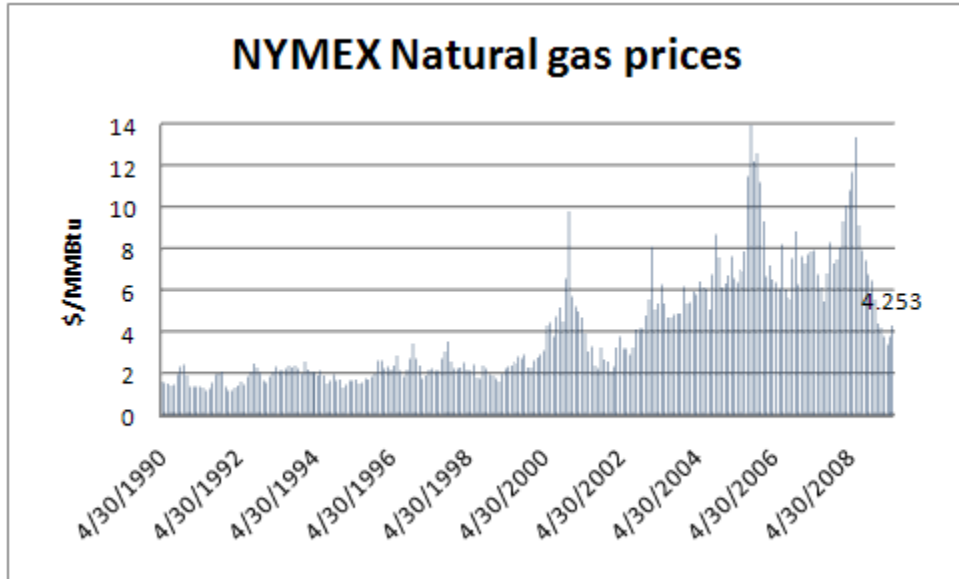
This was more due to rise in crude oil prices and Natural gas prices staying low. Crude oil reacted inversely to changes in dollar index since the beginning of the year. However the same trend that was expected of Natural gas didn't turn up. There were some other factors that were dampening the expected movement in Natural gas.

From the graph below it can be seen that the inventory levels for Natural gas kept falling week on week from Dec 08 till end of February 09. This was the peak period in demand for Natural gas as it was the winter season in the U.S. After this period *inventory levels kept rising* as Natural gas demand cycle follows a seasonal pattern. (Higher demand during winter season and lower demand during summer)

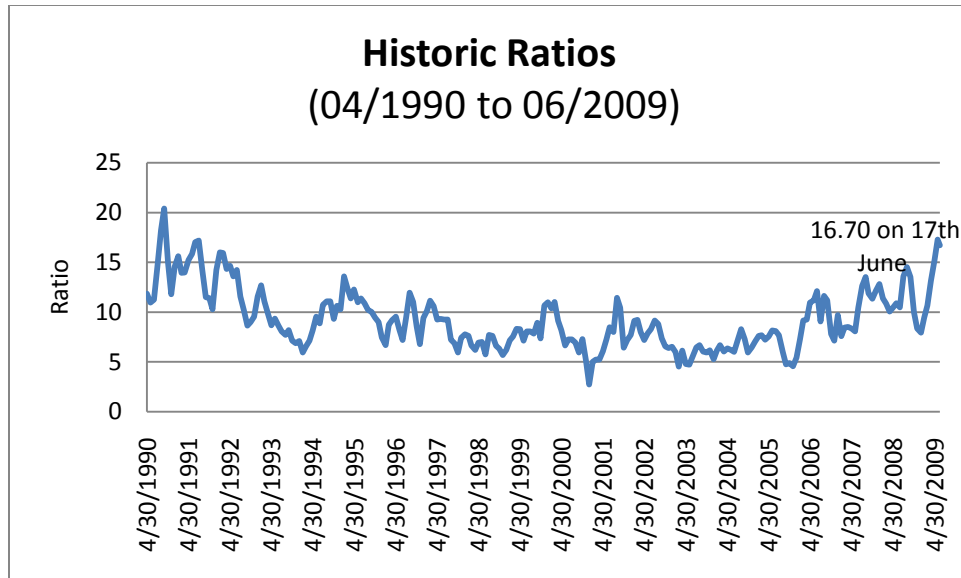


In the case of Crude oil the overall inventory levels had gradually fallen since beginning of year though there had been increases in inventory levels in between.

Price movements (From 04/1990 to 06/2009)



Price ratio = Crude oil price/Natural gas price



Source: Bloomberg

We expect this gap between Crude and Gas to narrow down towards the historical mean. Our prediction is based on the following analysis.

- A. Statistical analysis based on Mean reversion
- B. Fundamental analysis
- C. Technical analysis

We will be mentioning the analysis one by one

A. Statistical analysis based on Mean reversion

Mean reversion is a theory that suggests that prices or levels resulting from a stochastic process or a random process like trading will eventually tend to crawl back towards the historic mean or average over a period of time.

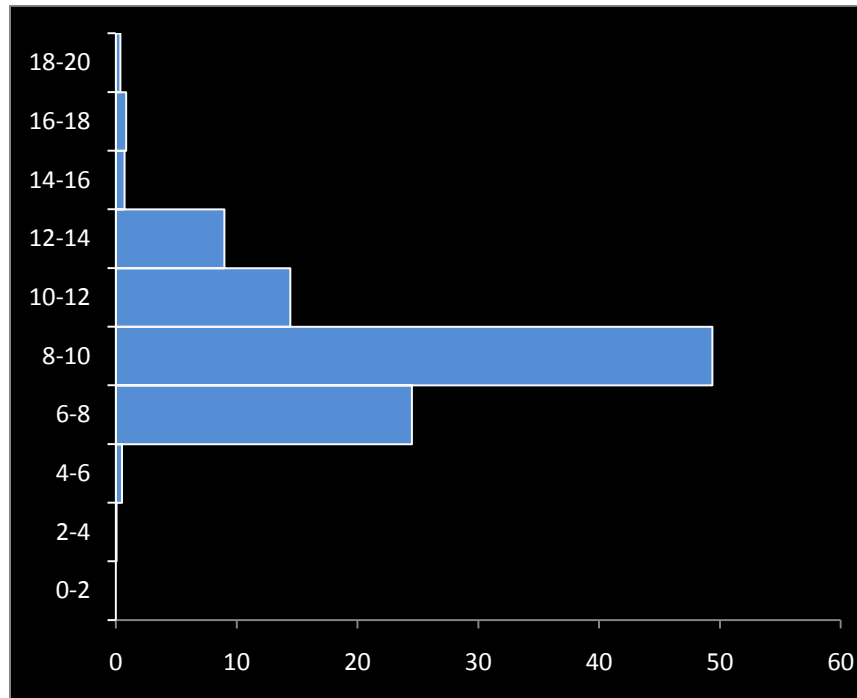
From the Graph below

- a. The ratio stayed in the 6-8 range in 24.5 %
- b. The ratio stayed in the 8-10 range in 49.4%
- c. The ratio stayed in the 10-12 range in 14.5
- d. The ratio stayed in the 12-14 range in 9%
- e. The ratio stayed in the 14-16 range in .733%
- f. The ratio stayed less than 6 and more than 16 in 1.87% times during the period.

During the period : 04/1990 to 06/2009

From the above figures the chances **the ratio** could be **under 16** are **98.133%**.

Graph showing % Occurrences during the period 04/1990 to 06/2009



Source: Bloomberg

Ratio Summary (Last 18 yrs)	
Last (NYMEX Closing on 17th June 2009)	16.7
Mean	9.2961
Off Avg	7.405
Median	8.6192
St Dev	3.0442
Off Avg StDev	2.43
Percentile	97.53
High 09/17/90	21.8803
Low 12/21/00	2.6429

B.Fundamental analysis:

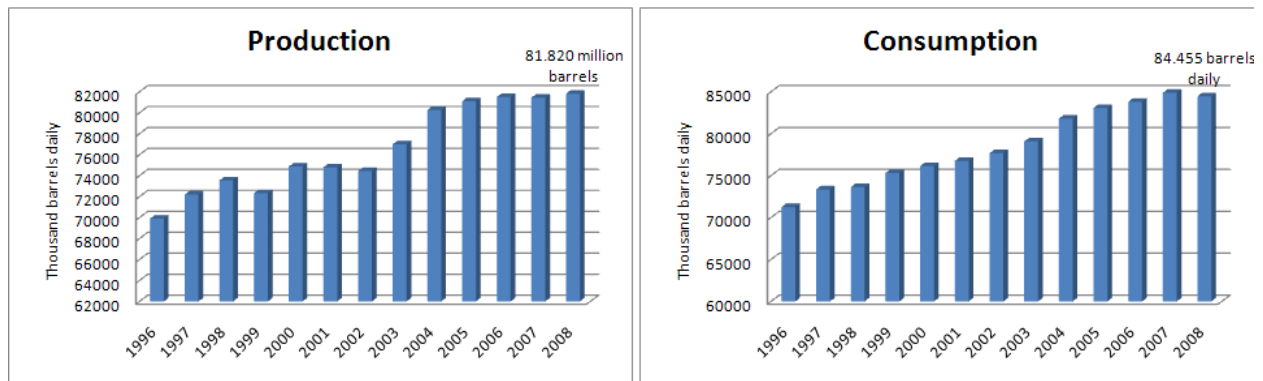
Changes in the Oil prices often affect gas prices but the same mechanism didn't work the other way round. This has to do with the size of individual markets. Oil prices are determined on the global market while gas market tends to be regionally segmented.

Crude oil prices have surged up from low of 43.83 (April) to a high of 73.23 (June) marking an increase of 67%. This has been a steep and a rampant outburst in prices merely on basis of the depreciating greenback. The dollar index which tracks the USD against the six other majors has declined by 12.69% since the month of March (89.62) to a level of 78.334 in June.

With no major change in the crude oil consumption patterns and with the world economies still under recovery, we expect prices to yield to correction in the near term.

Demand and supply: The World production and consumption of oil had been rising steadily hand in hand.

Total World



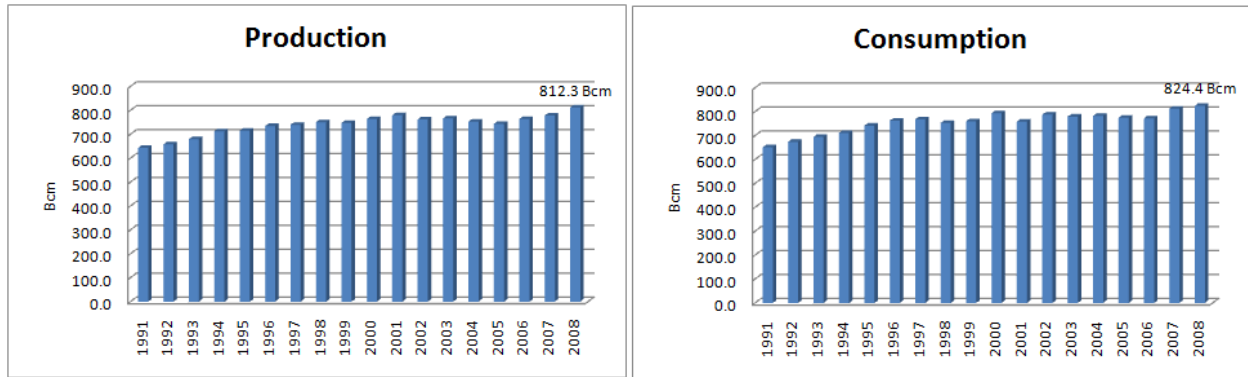
Source: BP Statistical review of world energy June 2009

Coming to **Natural gas**, since gas market is regionally segmented, we are considering the North American market which contributed to around 27% in world consumption and production and particularly the U.S market.

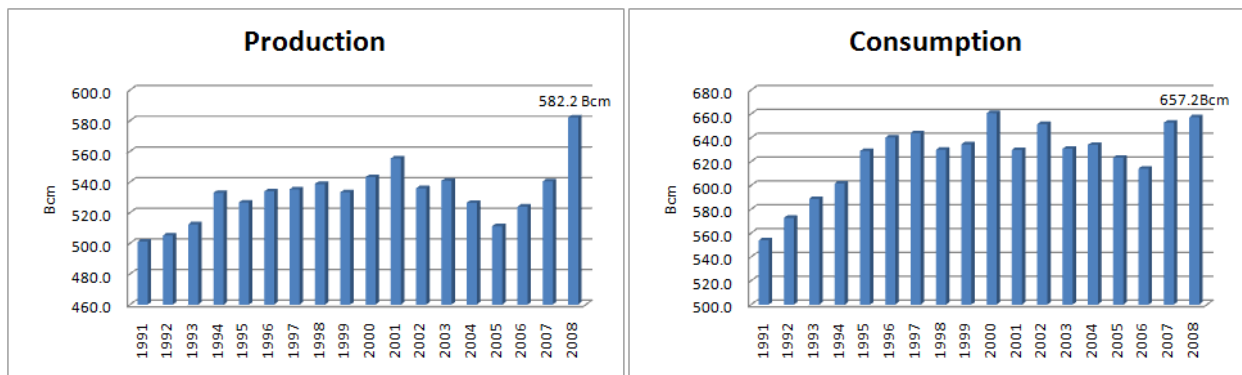
Demand and Supply: The production and consumption of Natural gas has been rising in recent years in this region. The trend is similar to Oil. But in the U.S region there is a higher gap compared to the gap

between production and consumption in the entire region. To cover the deficit, imports had been rising in the U.S at a CAGR of almost 4% since 2003 to 2007. As demand is higher than supply prices are expected to move up.

North American market



U.S market



Source: BP Statistical review of world energy June 2009

C. Technical analysis:

Crude oil –CL1 NYMEX

Crude oil prices at NYMEX are trading on the higher side and trading near to its major resistance levels of \$76.2 which is [38.2% of Fibonacci (\$147 to \$32.4)]. After the break out confirmation of cup and handle pattern, (mentioned in our Q-2 report) prices are trading higher to test its major resistance area.

As prices are trading slightly higher above its averages along with an over brought trading RSI-14 in weekly chart suggests a minor correction cannot be ruled out. If market makes a correction it can move to \$63.00 levels. This would be confirmed only if market breaches the trend channel support at \$69.00. Furthering on, if market sustains below \$63 then it could move to \$59 levels. Now, \$59 seems to be crucial support levels as it is the 23.6% retracement range and if market sustains above the support levels may see an uptrend to resume in the near term.

Our stance: A short term correction cannot be ruled out as the prices are trading at almost overbought zone. Moreover, if market sustains below \$76.80 levels the awaited correction would be confirmed. On the lower side the crucial supports are at \$63 and then \$59 levels. However, if market breaches above \$77 and sustains the same we may witness crude oil going to \$85-88 levels.

We expect crude oil to make correction only if it sustains below \$76.50-77 levels. However, our stance might change to bullish trend if market smoothly trades above \$77 and we could witness prices moving to \$85-88 levels.



NGAS

Natural gas prices at NYMEX are trading slightly higher after the break out confirmation of falling wedge which targeted around \$5.5 levels in short to medium term. Recently in a weekly chart prices have shown a break out of symmetric triangle which is supporting continuation of the uptrend which has been trading since \$4.2 levels and currently trading higher.

Stance: Since the prices are trading far below the averages in a longer term and a mean reversal can be expected. Moreover, it is near the 2% SD-lower band of the Bollinger band suggesting prices to reverse back to the averages. If market holds the same stance then we may witness natural gas moving higher to \$5.50-6.00 range.

We recommend buying on dips for the short term.



Preference: Basing our stress on mean reversal, Technical and fundamentals we expect Crude-Gas ratio to move downward towards the Historic mean level of 9.3.

Current Levels	
1.NYMEX Crude	\$71.1 per barrel
2.NYMEX Natural gas	\$4.1/MMBtu
3.MCX Crude (Parity)	Rs 3409 per barrel
4.MCX Natural gas (Parity)	Rs 204/MMBtu
5.Price Ratio (3/4)	16.71
6.USD/INR (Assumed)	48.00

Note: NYMEX Crude and gas prices are taken as the 17th June 2009 closing levels.

The formation of the table above will be explained below along with a simple investment strategy for an investor to take advantage from such a movement in prices as predicted above is mentioned below.

Commodity	1 Contract size		Initial margins
	On NYMEX	On MCX	On MCX
Crude Oil	1000 Barrels	100 Barrels	
Natural Gas	10,000MMBtu	1250MMBtu	

	17th June closing prices on NYMEX	Equivalent prices on MCX =NYMEX PRICE * Exchange rate	1 Contract size on MCX	1 Contract Value	
a. Crude Oil	\$ 71.03/barrel	71.03*48 = Rs 3409.44 per barrel	100 Barrels	3409.44*100	Rs 340944
b. Natural Gas	\$ 4.253/MMBtu	4.253*48 = Rs 204.144 per MMBtu	1250 MMBtu	204.144*1250	Rs 255180
c.Price Ratio = a/b	16.7	↓ Assumed exchange rate 1USD = 48 INR			

To execute the strategy

Total investment in purchasing Natural gas futures should equal the total investment in selling crude futures

Taking ratio of contract values of Crude and Gas from the table above = $\text{Rs}340944/\text{Rs}255180 = 1.336$

It means 1Crude contract value approximately equals 1.336 gas contracts in value.

No of crude contracts to be sold	No of Gas contracts to be bought
1	1.336
2	2.67
3	4.008
4	5.344
5	6.68

From the above table the Investment strategy to follow is

Sell 3 Contracts of Crude Oil	Buy 4 Contracts of Natural gas
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	Total Value of Positions
Crude	INR 1022832
Natural gas	INR 1020720
Absolute difference	INR 2112

The effectiveness of the plan can be evaluated from the tables given below:

*****Fundamental assumption:** The figures in the tables are based on the assumption the investor enters the market when ratio is at 16.7 and gas price level is at 204.

The first column in the table 1below refers to the price levels of Natural gas on NYMEX (\$/MMBtu).

The cells highlighted in yellow refer to the price gap =Crude oil price/Natural gas price

The figures from column 2 on refer to crude oil prices at different ratios.

So when ratio is 12 and Natural gas price is \$3.13/MMBtu Crude oil price is at $12 \times 3.13 = \$37.5/\text{barrel}$ (highlighted in red)

Table 1: Ratio of Crude Oil price / Natural gas price

Natural Gas	9	10	11	12	13	14	15	16	16.7	18	18.5	19	20	21
NYMEX (\$/MMBtu)	Crude Oil prices on NYMEX (\$/barrel)													
3.13	28.1	31.3	34.4	37.5	40.6	43.8	46.9	50.0	52.2	56.3	57.8	59.4	62.5	65.6
3.23	29.1	32.3	35.5	38.8	42.0	45.2	48.4	51.7	53.9	58.1	59.7	61.4	64.6	67.8
3.33	30.0	33.3	36.7	40.0	43.3	46.7	50.0	53.3	55.7	60.0	61.7	63.3	66.7	70.0
3.44	30.9	34.4	37.8	41.3	44.7	48.1	51.6	55.0	57.4	61.9	63.6	65.3	68.8	72.2
3.54	31.9	35.4	39.0	42.5	46.0	49.6	53.1	56.7	59.1	63.8	65.5	67.3	70.8	74.4
3.65	32.8	36.5	40.1	43.8	47.4	51.0	54.7	58.3	60.9	65.6	67.4	69.3	72.9	76.6
3.75	33.8	37.5	41.3	45.0	48.8	52.5	56.3	60.0	62.6	67.5	69.4	71.3	75.0	78.8
3.85	34.7	38.5	42.4	46.3	50.1	54.0	57.8	61.7	64.4	69.4	71.3	73.2	77.1	80.9
3.96	35.6	39.6	43.5	47.5	51.5	55.4	59.4	63.3	66.1	71.3	73.2	75.2	79.2	83.1
4.06	36.6	40.6	44.7	48.8	52.8	56.9	60.9	65.0	67.8	73.1	75.2	77.2	81.3	85.3
4.17	37.5	41.7	45.8	50.0	54.2	58.3	62.5	66.7	69.6	75.0	77.1	79.2	83.3	87.5
4.25	38.3	42.5	46.8	51.0	55.3	59.5	63.8	68.0	71.0	76.5	78.6	80.8	85.0	89.3
4.27	38.4	42.7	47.0	51.3	55.5	59.8	64.1	68.3	71.3	76.9	79.0	81.1	85.4	89.7
4.38	39.4	43.8	48.1	52.5	56.9	61.3	65.6	70.0	73.1	78.8	80.9	83.1	87.5	91.9
4.48	40.3	44.8	49.3	53.8	58.2	62.7	67.2	71.7	74.8	80.6	82.9	85.1	89.6	94.1
4.58	41.3	45.8	50.4	55.0	59.6	64.2	68.8	73.3	76.5	82.5	84.8	87.1	91.7	96.3
4.69	42.2	46.9	51.6	56.3	60.9	65.6	70.3	75.0	78.3	84.4	86.7	89.1	93.8	98.4
4.79	43.1	47.9	52.7	57.5	62.3	67.1	71.9	76.7	80.0	86.3	88.6	91.0	95.8	100.6
4.90	44.1	49.0	53.9	58.8	63.6	68.5	73.4	78.3	81.8	88.1	90.6	93.0	97.9	102.8
5.00	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	83.5	90.0	92.5	95.0	100.0	105.0
5.10	45.9	51.0	56.1	61.3	66.4	71.5	76.6	81.7	85.2	91.9	94.4	97.0	102.1	107.2
5.21	46.9	52.1	57.3	62.5	67.7	72.9	78.1	83.3	87.0	93.8	96.4	99.0	104.2	109.4

The table 2 refers to the equivalent prices on MCX. For a Natural gas price of \$5/MMBtu on NYMEX, the equivalent price on MCX = Assumed exchange rate * Gas price on NYMEX = 48*5 = Rs 240/MMBtu

Table 2: Indian Parity for the International Natural gas and Crude oil prices from Table No.1

Natural Gas	9	10	11	12	13	14	15	16	16.7	18	18.5	19	20	21
MCX (Rs/MMBtu)	Crude Oil prices on MCX (Rs/barrel)													
150	1350	1500	1650	1800	1950	2100	2250	2400	2505	2700	2775	2850	3000	3150
155	1395	1550	1705	1860	2015	2170	2325	2480	2589	2790	2868	2945	3100	3255
160	1440	1600	1760	1920	2080	2240	2400	2560	2672	2880	2960	3040	3200	3360
165	1485	1650	1815	1980	2145	2310	2475	2640	2756	2970	3053	3135	3300	3465
170	1530	1700	1870	2040	2210	2380	2550	2720	2839	3060	3145	3230	3400	3570
175	1575	1750	1925	2100	2275	2450	2625	2800	2923	3150	3238	3325	3500	3675
180	1620	1800	1980	2160	2340	2520	2700	2880	3006	3240	3330	3420	3600	3780
185	1665	1850	2035	2220	2405	2590	2775	2960	3090	3330	3423	3515	3700	3885
190	1710	1900	2090	2280	2470	2660	2850	3040	3173	3420	3515	3610	3800	3990
195	1755	1950	2145	2340	2535	2730	2925	3120	3257	3510	3608	3705	3900	4095
200	1800	2000	2200	2400	2600	2800	3000	3200	3340	3600	3700	3800	4000	4200
204	1836	2040	2244	2448	2652	2856	3060	3264	3407	3672	3774	3876	4080	4284
205	1845	2050	2255	2460	2665	2870	3075	3280	3424	3690	3793	3895	4100	4305
210	1890	2100	2310	2520	2730	2940	3150	3360	3507	3780	3885	3990	4200	4410
215	1935	2150	2365	2580	2795	3010	3225	3440	3591	3870	3978	4085	4300	4515
220	1980	2200	2420	2640	2860	3080	3300	3520	3674	3960	4070	4180	4400	4620
225	2025	2250	2475	2700	2925	3150	3375	3600	3758	4050	4163	4275	4500	4725
230	2070	2300	2530	2760	2990	3220	3450	3680	3841	4140	4255	4370	4600	4830
235	2115	2350	2585	2820	3055	3290	3525	3760	3925	4230	4348	4465	4700	4935
240	2160	2400	2640	2880	3120	3360	3600	3840	4008	4320	4440	4560	4800	5040
245	2205	2450	2695	2940	3185	3430	3675	3920	4092	4410	4533	4655	4900	5145
250	2250	2500	2750	3000	3250	3500	3750	4000	4175	4500	4625	4750	5000	5250

The table 3 below shows how an investor will be affected by the movement in prices.

Example : Say if Natural gas future prices rise at the end of 1 week to Rs245/MMBtu and Crude future prices are at say at Rs 2880/barrel. Now if the investor wishes to square off, Since the Investor is buying Natural gas at Rs204/MMBtu and Crude at Rs3407/barrel His net pay off will be as follows

For **Natural gas:** Investor initially bought gas at Rs204 and now is selling at Rs 245.Profit is Rs 41. Similarly for **Crude oil:** The investor sold oil at Rs3407 and is buying back the same quantity at Rs2940.He earns a profit of Rs467.

The earnings discussed above for Gas and Crude are highlighted in yellow and red in the table below.

Table 3: Profit/Loss (P/L) per unit

Natural Gas P/L (INR) Per MMBtu	9	10	11	12	13	14	15	16	16.7	18	18.5	19	20	21
	Profit/Loss in Rupees per barrel on MCX (Crude Oil)													
-54	2057	1907	1757	1607	1457	1307	1157	1007	902	707	632	557	407	257
-49	2012	1857	1702	1547	1392	1237	1082	927	818	617	539	462	307	152
-44	1967	1807	1647	1487	1327	1167	1007	847	735	527	447	367	207	47
-39	1922	1757	1592	1427	1262	1097	932	767	651	437	354	272	107	-58
-34	1877	1707	1537	1367	1197	1027	857	687	568	347	262	177	7	-163
-29	1832	1657	1482	1307	1132	957	782	607	484	257	169	82	-93	-268
-24	1787	1607	1427	1247	1067	887	707	527	401	167	77	-13	-193	-373
-19	1742	1557	1372	1187	1002	817	632	447	317	77	-16	-108	-293	-478
-14	1697	1507	1317	1127	937	747	557	367	234	-13	-108	-203	-393	-583
-9	1652	1457	1262	1067	872	677	482	287	150	-103	-201	-298	-493	-688
-4	1607	1407	1207	1007	807	607	407	207	67	-193	-293	-393	-593	-793
0	1571	1367	1163	959	755	551	347	143	0	-265	-367	-469	-673	-877
1	1562	1357	1152	947	742	537	332	127	-17	-283	-386	-488	-693	-898
6	1517	1307	1097	887	677	467	257	47	-100	-373	-478	-583	-793	-1003
11	1472	1257	1042	827	612	397	182	-33	-184	-463	-571	-678	-893	-1108
16	1427	1207	987	767	547	327	107	-113	-267	-553	-663	-773	-993	-1213
21	1382	1157	932	707	482	257	32	-193	-351	-643	-756	-868	-1093	-1318
26	1337	1107	877	647	417	187	-43	-273	-434	-733	-848	-963	-1193	-1423
31	1292	1057	822	587	352	117	-118	-353	-518	-823	-941	-1058	-1293	-1528
36	1247	1007	767	527	287	47	-193	-433	-601	-913	-1033	-1153	-1393	-1633
41	1202	957	712	467	222	-23	-268	-513	-685	-1003	-1126	-1248	-1493	-1738
46	1157	907	657	407	157	-93	-343	-593	-768	-1093	-1218	-1343	-1593	-1843

The earnings in the square off discussed earlier are per 1MMBtu and 1 barrel for Natural gas and Crude Oil respectively.

Since the strategy is to get into 3 contracts of Oil and 4 Contracts of Gas, the table below shows the pay off for the respective number of contracts in each commodity when the investor is about to square off.

So in the example discussed above investor earns Rs 41 per 1 MMBtu and Rs 467 per barrel. 4 Contracts of Gas equals to $1250 * 4 = 5000$ MMBtu. So profit from squaring off 4 contracts of gas = $5000 * 41 = 2.05$ Lakhs (highlighted in yellow in table 4 below). Similarly 3 Contracts in Oil equals $100 * 3 = 300$ barrels. So

squaring off those 3 contracts in oil will result in $300 \times 467 = 1.40$ Lakhs (highlighted in red in table 4 below). (Look at Tables for contract sizes for Gas and Oil on MCX mentioned before)

Table No.4: Profit/Loss (in Lacks of INR)

Natural Gas P/L	9	10	11	12	13	14	15	16	16.7	18	18.5	19	20	21
Buy 4 Lots	P/L (Lakhs of INR) on MCX Selling 3 Lots (Crude Oil)													
-2.70	6.17	5.72	5.27	4.82	4.37	3.92	3.47	3.02	2.71	2.12	1.90	1.67	1.22	0.77
-2.45	6.04	5.57	5.11	4.64	4.18	3.71	3.25	2.78	2.45	1.85	1.62	1.39	0.92	0.46
-2.20	5.90	5.42	4.94	4.46	3.98	3.50	3.02	2.54	2.20	1.58	1.34	1.10	0.62	0.14
-1.95	5.77	5.27	4.78	4.28	3.79	3.29	2.80	2.30	1.95	1.31	1.06	0.82	0.32	-0.17
-1.70	5.63	5.12	4.61	4.10	3.59	3.08	2.57	2.06	1.70	1.04	0.79	0.53	0.02	-0.49
-1.45	5.50	4.97	4.45	3.92	3.40	2.87	2.35	1.82	1.45	0.77	0.51	0.25	-0.28	-0.80
-1.20	5.36	4.82	4.28	3.74	3.20	2.66	2.12	1.58	1.20	0.50	0.23	-0.04	-0.58	-1.12
-0.95	5.23	4.67	4.12	3.56	3.01	2.45	1.90	1.34	0.95	0.23	-0.05	-0.32	-0.88	-1.43
-0.70	5.09	4.52	3.95	3.38	2.81	2.24	1.67	1.10	0.70	-0.04	-0.32	-0.61	-1.18	-1.75
-0.45	4.96	4.37	3.79	3.20	2.62	2.03	1.45	0.86	0.45	-0.31	-0.60	-0.89	-1.48	-2.06
-0.20	4.82	4.22	3.62	3.02	2.42	1.82	1.22	0.62	0.20	-0.58	-0.88	-1.18	-1.78	-2.38
0.00	4.71	4.10	3.49	2.88	2.26	1.65	1.04	0.43	0.00	-0.80	-1.10	-1.41	-2.02	-2.63
0.05	4.69	4.07	3.46	2.84	2.23	1.61	1.00	0.38	-0.05	-0.85	-1.16	-1.46	-2.08	-2.69
0.30	4.55	3.92	3.29	2.66	2.03	1.40	0.77	0.14	-0.30	-1.12	-1.43	-1.75	-2.38	-3.01
0.55	4.42	3.77	3.13	2.48	1.84	1.19	0.55	-0.10	-0.55	-1.39	-1.71	-2.03	-2.68	-3.32
0.80	4.28	3.62	2.96	2.30	1.64	0.98	0.32	-0.34	-0.80	-1.66	-1.99	-2.32	-2.98	-3.64
1.05	4.15	3.47	2.80	2.12	1.45	0.77	0.10	-0.58	-1.05	-1.93	-2.27	-2.60	-3.28	-3.95
1.30	4.01	3.32	2.63	1.94	1.25	0.56	-0.13	-0.82	-1.30	-2.20	-2.54	-2.89	-3.58	-4.27
1.55	3.88	3.17	2.47	1.76	1.06	0.35	-0.35	-1.06	-1.55	-2.47	-2.82	-3.17	-3.88	-4.58
1.80	3.74	3.02	2.30	1.58	0.86	0.14	-0.58	-1.30	-1.80	-2.74	-3.10	-3.46	-4.18	-4.90
2.05	3.61	2.87	2.14	1.40	0.67	-0.07	-0.80	-1.54	-2.05	-3.01	-3.38	-3.74	-4.48	-5.21
2.30	3.47	2.72	1.97	1.22	0.47	-0.28	-1.03	-1.78	-2.30	-3.28	-3.65	-4.03	-4.78	-5.53

The table 5 below adds up the pay off from individual commodities. For example mentioned before total net payoff from squaring off 4 contracts in Gas and 3 Contracts in Oil is 1.45 lakhs +2.05 lakhs= Rs 3.45 lakhs(highlighted as red in table below).

Table No.5: Pay Off Matrix for the Strategy at different Natural gas and Crude Oil Levels

Stop loss Trigger

Natural Gas MCX Price (Rs/MMBtu)	9	10	11	12	13	14	15	16	16.7	18	18.5	19	20	21
	Net Payoff by executing the strategy (Lakhs of INR)													
150	3.47	3.02	2.57	2.12	1.67	1.22	0.77	0.32	0.0054	-0.58	-0.80	-1.03	-1.48	-1.93
155	3.59	3.12	2.66	2.19	1.73	1.26	0.80	0.33	0.00049	-0.60	-0.83	-1.06	-1.53	-1.99
160	3.70	3.22	2.74	2.26	1.78	1.30	0.82	0.34	0.0044	-0.62	-0.86	-1.10	-1.58	-2.06
165	3.82	3.32	2.83	2.33	1.84	1.34	0.85	0.35	0.0039	-0.64	-0.89	-1.13	-1.63	-2.12
170	3.93	3.42	2.91	2.40	1.89	1.38	0.87	0.36	0.0034	-0.66	-0.91	-1.17	-1.68	-2.19
175	4.05	3.52	3.00	2.47	1.95	1.42	0.90	0.37	0.0029	-0.68	-0.94	-1.20	-1.73	-2.25
180	4.16	3.62	3.08	2.54	2.00	1.46	0.92	0.38	0.0024	-0.70	-0.97	-1.24	-1.78	-2.32
185	4.28	3.72	3.17	2.61	2.06	1.50	0.95	0.39	0.0019	-0.72	-1.00	-1.27	-1.83	-2.38
190	4.39	3.82	3.25	2.68	2.11	1.54	0.97	0.40	0.0014	-0.74	-1.02	-1.31	-1.88	-2.45
195	4.51	3.92	3.34	2.75	2.17	1.58	1.00	0.41	0.0009	-0.76	-1.05	-1.34	-1.93	-2.51
200	4.62	4.02	3.42	2.82	2.22	1.62	1.02	0.42	0.0004	-0.78	-1.08	-1.38	-1.98	-2.58
204	4.71	4.10	3.49	2.88	2.26	1.65	1.04	0.43	0.00	-0.80	-1.10	-1.41	-2.02	-2.63
205	4.74	4.12	3.51	2.89	2.28	1.66	1.05	0.43	-0.0001	-0.80	-1.11	-1.41	-2.03	-2.64
210	4.85	4.22	3.59	2.96	2.33	1.70	1.07	0.44	-0.0006	-0.82	-1.13	-1.45	-2.08	-2.71
215	4.97	4.32	3.68	3.03	2.39	1.74	1.10	0.45	-0.0011	-0.84	-1.16	-1.48	-2.13	-2.77
220	5.08	4.42	3.76	3.10	2.44	1.78	1.12	0.46	-0.0016	-0.86	-1.19	-1.52	-2.18	-2.84
225	5.20	4.52	3.85	3.17	2.50	1.82	1.15	0.47	-0.0021	-0.88	-1.22	-1.55	-2.23	-2.90
230	5.31	4.62	3.93	3.24	2.55	1.86	1.17	0.48	-0.0026	-0.90	-1.24	-1.59	-2.28	-2.97
235	5.43	4.72	4.02	3.31	2.61	1.90	1.20	0.49	-0.0031	-0.92	-1.27	-1.62	-2.33	-3.03
240	5.54	4.82	4.10	3.38	2.66	1.94	1.22	0.50	-0.0036	-0.94	-1.30	-1.66	-2.38	-3.10
245	5.66	4.92	4.19	3.45	2.72	1.98	1.25	0.51	-0.0041	-0.96	-1.33	-1.69	-2.43	-3.16
250	5.77	5.02	4.27	3.52	2.77	2.02	1.27	0.52	-0.0046	-0.98	-1.35	-1.73	-2.48	-3.23

From table no.5, it can be seen that any move below a price ratio of 16.7 will be beneficial for an investor.

Initial investment needed to execute the strategy

a. Margin on Natural gas (Four lots)	INR 51036.60
b. Margin on Crude Oil (Three Lots)	INR 51141.00
a+b	INR 102177.60
MTM provision (100% of Margin)	INR 102177.60
Total amount to be invested	INR 204355.20

Capital Deployment

The amount of capital to be deployed for execution of such strategy will be INR 204355.20. The capital to be invested will be in terms of margin amount of THREE Crude Oil and FOUR lots of Natural gas. Mark to Market provision of 100% of the total margin is also to be provided for.

Strategy Summary

Sell – Three contracts of MCX Crude Oil

Buy – Four contracts of MCX Natural gas

Capital Required – INR 204355.20

Crucial Ratio levels:

Favorable/Downside levels - 16.7 and below

Stop loss triggered at 18.5

When stop loss is initiated the investor should square-off his positions by getting in to opposite transactions involving

a. Selling 4 lots of MCX Natural gas

b. Buying 3 lots of MCX Crude Oil

Note:

1. Payoffs are shown in table no.4 and are with respect to parity prices. Actual prices may differ from parity prices.
2. Strategy is based upon mean reversal rather than trend reversal.

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