



Fundamental & Technical Analysis of Crude Oil

Prices

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The human mind is not as good at processing large amounts of information as we might like. Psychologists have shown that human beings are only able to juggle small numbers of related and often conflicting pieces of information without making judgment errors. As a result, individuals faced with the vast amounts of information available to support investment decisions often find themselves swamped by the enormity of the task; unable to see the wood from the trees. Technical analysis is a field of financial markets research that works to address the above problem by focusing on a single, commonly available, data source that reflects all known information and activity relating to all monetary securities- Price history. Technical analysts argue that as markets are efficient, prices reflect all known information and that they move over time as participants react to new information and changing needs.

As a result, the technical analysis of these price changes can provide real insight into the market dynamics and be used to develop trade strategies that exhibit superior risk/reward characteristics. While technical analysis approaches have developed significantly over the past few decades, some techniques are far more ancient. While their real origins are anonymous, Japanese candlestick charts have been recorded as being employed in the rice markets as far back as the 1600s. What is particularly interesting is that various of these ancient approaches continue to provide highly effective trading signals when applied to modern markets and securities.

Crude oil price volatility is in the midst of the largest business risk that oil and gas companies face. This is followed by unstable policy regime, managing costs and risks emerging from technological advancements. The high levels and rapid fluctuations of petroleum prices have become a great concern to individual consumers, firms, policy makers and society. Technical Analysis is the forecasting of future financial price movements based on an examination of past price movements. Like weather forecasting, technical analysis does not result in absolute predictions about the future. Instead,

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technical analysis can help investors anticipate what is "likely" to happen to prices over time. Technical analysis uses a wide variety of charts that show price over time. Hence, to mitigate the negative impacts of price volatility and to predict about the future price movement of crude oil and natural gas we can use technical analysis.

Technical analysis is the study of market action, primarily through the use of charts, for the purpose of forecasting price trends. The term "market action" includes the three-principal source of action available to the technician-price, volume and open interest. This research paper highlights fundamental factor which affects the Brent price and analysed the factor which are highly correlated with Brent price and on the basis of the results forecasted the Brent price for next five years. Fundamental analysis of Brent oil, price pattern & movement of crude oil has also been carried out using candlestick technical tool.

Oil is one of the most important commodities in the world. Oil is greatest in importance because of its significance of being a far easier to use than any alternative fossil fuel. Oil price has the capability to move the whole spectrum of the market because of its demand and supply. In today's scenario the oil prices are determined by an association, the OPEC (Oil Producing and Exporting Countries), it was established on 1960 to coordinate oil production among the leading exporters. About 65% - 70% of the world's oil reserves are in the Middle East and the Arab Countries.

The price of crude oil experiences broad price swings, same as prices of other commodities, during period when there is shortage or oversupply of particular commodities. The crude oil price cycle may extend over several years responding to changes in demand as well as OPEC and non-OPEC supply. In the crude oil industry, there are oil names such as Brent Light Crude Oil and Bonny Light. Brent Crude is a major exchange traded crude oil in the world; oil is priced in two ways, in spot market and in futures market across the global.

Following a sharp drop amidst the global economic crisis and a subsequent recovery, the spot price of crude oil has been broadly stable for the past couple of years. This study discuss the factors that drive oil demand and supply and, hence, the price of the resource. A set of oil demand equations of OECD and non-OECD countries, impact the future oil price. The scenario analysis suggests that a return of world growth to slightly below pre-crisis rates would be consistent with an increase in the price of Brent crude to far above early-2012 levels by 2020. This increase would be mostly driven by higher demand from non-OECD economies – in particular China and India. The expected rise in the oil price is unlikely to be smooth. Sudden changes in the supply or demand of oil can have very large effects on the price in the short run

The price of crude oil, from which petroleum products such as gasoline are derived, is influenced by a number of factors beyond the traditional movements of supply and

demand, notably geopolitics. Some of the lowest cost reserves are located in sensitive areas of the world. There is not one price for crude oil but many. World crude oil prices are established in relation to three market traded benchmarks (West Texas Intermediate [WTI], Brent, Dubai), and are quoted at premiums or discounts to these prices.

Literature Review

Does OPEC influence crude oil price? Testing for co movement & causality between

Regional crude oil price By-Jan Bentsen

This is a white paper which analyse the affect of OPEC on the crude oil price. The empirical results are that causality is most likely bi-directional among these crude oil prices – and hence rejecting a regionalization hypothesis of the global oil market – and also an influence from the OPEC oil price towards Bent and WTI, which are usually claimed to have a benchmark role.

Crude oil prices “Market fundamental or speculation” By Paul

Studied the crude oil prices whether fundamental or the speculation determine the prices of crude oil. The empirical results are that causality is most likely bi-directional among these crude oil prices – and hence rejecting a regionalization hypothesis of the global oil market – and also an influence from the OPEC oil price towards Bent and WTI, which are usually claimed to have a benchmark role.

Brent crude prices vulnerable, despite positive economic -The article offers information on the condition of the prices of **Brent** crude oil. It notes that the 2010 begun with weak **demand** in the Organization for Economic Co-operation & Development (**OECD**) and the crude price was lower at that time.

Understanding Crude Oil Prices By James D. Hamilton

This paper examines the factors responsible for changes in crude oil prices. The paper reviews the statistical behaviour of oil prices, relates this to the predictions of theory, and looks in detail at key features of petroleum demand and supply. Topics discussed include the role of commodity speculation, OPEC, and resource depletion. The paper concludes that although scarcity rent made a negligible contribution to the price of oil in 1997, it could now begin to play a role.

Andrew W. LO, Harry Mamaysky, and Jiang Wang studied systematic and automatic approach to technical pattern recognition using nonparametric kernel

regression, and they apply this method to a large number of U.S. stocks from 1962 to 1996 to evaluate the effectiveness of technical analysis. By comparing the unconditional empirical distribution of daily stock returns to the conditional distribution—conditioned on specific technical indicators such as head-and-shoulders or double-bottoms—they find that over the 31-year sample period, several technical indicators do provide incremental information and may have some practical value.

Gerwin A.W. Griffioen The goal of his research is to test the weak form of the efficient markets hypothesis by applying a broad range of technical trading strategies to a large number of different data sets. In particular, he focus on the question whether, after correcting for transaction costs, risk and data snooping, technical trading rules have statistically significant forecasting power and can generate economically significant profits.

There is adequate literature available for the reference for the project. Extensive usage has been made of all the available literature for the information. The books on technical analysis of the financial markets have been of great help for the understanding of the concept of technical analysis. Technical analysis of the financial market **by John J Murphy**, Energy Markets-Price risk management and trading by Tom James, Candlesticks charting techniques by **Steve Nison** needs special mention as these books has been extensively used.

Also, for the understanding of the concept many research papers both international as well as national will be studied. These research papers are very helpful as these bring the clarity about the subject of the topics. They help in showing the correct direction for the project work and how one shall proceed with it. Over the study of different research papers, it has been found that every paper has different aspect to work out, as the papers are written on problems faced by Traders, refiners, investors due to oil price volatility.

Journals by IFTA (International federation of technical analysis and MTA (Market technicians association) are very helpful as these bring clarity about the research.

Research Methodology

- ❖ **Type of research:** Descriptive
- ❖ **Data Source:** Secondary Data collected by visiting various Internet website of Commodity Exchanges e.g. NYMEX, MCX, ICE, EIA, IEA , various global futures exchange websites, PLATTS, Petroleum Argus, IMF, Department of Energy, Chicago Climate Exchange, MCX etc.
- ❖ **Data Analysis:** Data collected from different sources analyzed using different technical analysis tools like trend analysis, moving average conversions and diversions.

Fundamental analysis has done by various statistical & econometrics tools.

Research Objectives

- ❖ To analyze the fundamental factor affecting the Brent crude price.
- ❖ To predict the future price movement of the Brent crude oil.
- ❖ To study the candlestick charts, analyze the market movement & suggest the decision to be taken.

Research tools:

Econometrics tools

- Correlation
- Regressions
- Bi-Variate regressions

Statistical tools- Bar diagrams & line charts

Technical tools

- ❖ Trend Analysis using different patterns
- ❖ Volume and Open Interest Analysis
- ❖ Moving Average Conversions and Diversions
- ❖ Elliot Wave Theory
- ❖ Oscillators

FUNDAMENTAL FACTOR EFFECTING BRENT PRICES

Supply-and demand balance largely dictates virtually all commodity futures price. While the strategic role of crude oil for almost every country determines that crude oil is bounded to be tied tightly with the geopolitical factors. Few will argue that the recent decades are interesting times for energy industry. Factors on the supply side that may affect prices include variations in crude oil production, net imports, or storage levels. Increases in supply tend to pull prices down, while decreases in supply tend to push prices up.

Factors on the demand side include economic growth and oil prices. Higher demand tends to lead to higher prices, while lower demand can lead to lower prices.

SUPPLY FROM OPEC COUNTRIES

OPEC is intergovernmental and was created at the Baghdad Conference on 10–14 September 1960, by Iraq, Kuwait, Iran, Saudi Arabia and Venezuela. Then it was joined by nine more governments: Libya, United Arab Emirates, Qatar, Indonesia, Algeria, Nigeria, Ecuador, Angola, and Gabon.

OPEC is a swing producer and its decisions have had considerable influence on international oil prices. For example, in the 1973 energy crisis some OPEC members refused to ship oil to western countries that had supported Israel in the Yom Kippur War, which Israel had fought against Egypt and Syria. This refusal caused a fourfold increase in the price of oil, which lasted five months, starting on October 17, 1973, and ending on March 18, 1974. OPEC nations then agreed, on January 7, 1975, to raise crude oil prices by 10%. At that time,

OPEC accounts for 40% crude oil production of the world and 81% reserve is in OPEC. Like prices of other commodities the price of crude oil experiences wide price swings in times of shortage or oversupply. The crude oil price cycle may extend over several years responding to changes in demand as well as OPEC and non-OPEC supply. The main economic principle on the basis of which the price is determined by the interaction between demand and supply, does not work if applied tout-court to the oil market. As a matter of fact, OPEC, trying to lead the oil price dynamics, has implemented output cuts and quota increases on numerous occasions, but always with very limited real effects.

SUPPLY NON-OPEC

Oil production from countries outside the Organization of the Petroleum Exporting Countries (OPEC) currently represents about 60 percent of world oil production. Key centers of non-OPEC production include North America, regions of the former Soviet Union, and the North Sea. In contrast to OPEC oil production, which is subject to central coordination, non-OPEC producers make independent decisions about oil production. Also, in contrast to OPEC, where oil production is mostly in the hands of national oil companies (NOCs), international or investor-owned oil companies (IOCs) perform most of the production activities in non-OPEC countries.

Producers in non-OPEC countries are generally regarded as price takers, that is, they respond to market prices rather than attempt to influence prices by managing production. As a result, non-OPEC producers tend to produce at or near full capacity and so have little spare capacity.

Oil prices are not only affected by actual non-OPEC production, but also by changes in expectations about future non-OPEC supply. From 2005 through 2008, final production reports for non-OPEC production were consistently lower than forecast expectations. This reduction in anticipated production forced the world to unexpectedly rely more

heavily on OPEC crude, drawing down their levels of spare capacity. The downward revisions in expectations of non-OPEC production contributed to upward pressure on oil prices.

DEMAND: OECD COUNTRIES

The Organization of Economic Cooperation and Development (OECD) consist of the United States, much of Europe, and other advanced countries. At 53 percent of world oil consumption in 2010, these large economies consume more oil than the non-OECD countries, but have much lower oil consumption growth. Oil consumption in the OECD countries actually declined in the decade between 2000 and 2010, whereas non-OECD consumption rose 40 percent during the same period.

DEMAND: NON-OECD COUNTRIES

Oil consumption in developing countries that are not part of the Organization of Economic Cooperation and Development (OECD) has risen sharply in recent years. While oil consumption in the OECD countries declined between 2000 and 2010, non-OECD oil consumption increased more than 40 percent. China, India, and Saudi Arabia had the largest growth in oil consumption among the countries in the non-OECD during this period.

SPECULATIVE ACTIVITY

The unprecedented surge in the spot price of crude oil during 2003-08 and 2010-2011 sparked a heated public debate about the determinants of the price of oil. The popular view was that the surge in the price of oil during 2003-08 and 2010-2011 could not be explained by economic fundamentals. Instead, it was caused by what has been called the "financialization" of oil futures markets, with speculators becoming a major determinant of prices. This interpretation led to calls from politicians to regulate oil futures markets.

Financial activity in the oil futures markets has contributed to destabilize oil prices in recent years. We define a destabilizing financial shock as a shift in oil prices that is not related to current and expected fundamentals, and thereby distorts efficient pricing in the oil market. In this paper, we assess whether and to what extent financial activity in the oil futures markets has contributed to destabilize oil prices in recent years. We define a destabilizing financial shock as a shift in oil prices that is not related to current and expected fundamentals, and thereby distorts efficient pricing in the oil market. Moreover, financial activity appears to have exacerbated the volatility in the oil market over the past decade, particularly in 2007-2008. However, shocks to oil demand and supply remain the main drivers of oil price swing.

Typically, speculative behavior in the oil market is attributed to the financial activity of traders that actively enter the futures market and buy or sell according to (expected) fundamentals.

GEOPOLITICAL FACTOR

Just as the lack of surplus capacity is related to the growth in global demand, the impact on prices due to geopolitical risks is related to the lack of surplus capacity. If surplus capacity were sufficient to make up for any reasonable likelihood of a loss in supply, then the risks would not have as great an impact on price. However, because there is very limited surplus capacity, concerns about potential or existing supply problems in Nigeria, Iran, Iraq, Venezuela, and elsewhere, have exacerbated price increases related to the supply-and-demand factor above. Or put another way, these risks to supply would not be putting as much upward pressure on prices if fundamentals were not tight to begin with.

The risks brought by geopolitical factors include instabilities of a nation's government and/or domestic economy; such nations do not necessarily to be an major natural gas and crude oil exporter.

ECONOMIC GROWTH

Economic activity is a major factor influencing crude oil markets. When the economy improves, the increased demand for goods and services from the commercial and industrial sectors generates an increase in crude oil demand. This is particularly true in the industrial sector, which is the leading consumer of crude oil as both transportation and as a feedstock refineries.

Economic uncertainty in Europe as well as manufacturing data from China that was below market expectations contributed to the recent crude oil price declines. The unemployment rate for Euro zone countries increased to 11.9 percent in February, an increase over last month and a record high. Additionally, the uncertain outcome of the recent government elections in Italy has put into question future economic recovery and reforms. In China, the February Purchasing Managers Index (a leading indicator for the manufacturing sector) unexpectedly declined from January and is now just slightly above the dividing line indicating likely expansion or contraction.

Effect of Seasonality on Crude Oil Markets

The oil consumption around the year varies from month to month consumption tends to increase in fourth quarter (Oct-Dec) and first quarter (Jan-Mar) of any year as compared to second quarter (Apr-Jun) and third quarter (Jul-Sep). Besides the normal requirement

of fuels for transportation, fuels are also used for heating purposes since the winter months fall in the 1st and 4th quarters of a year, the demand for oil goes up during these quarters.

Seasonality is evident in respect of oil demand, the same does not hold true in case of oil prices. Due to stock build up and depending upon the severity of winter weather, oil prices could be higher or sometimes lower in the peak demand seasons as compared to the other months. Besides overall demand, the summer and winter months are also important with respect to individual product demand.

Data analysis

Fundamental analysis: Correlation between Brent prices and fundamental factors

(OECD demand, non-OECD demand, OPEC supply, non-OPEC supply) affecting Brent price. Annually data taken from 2003 to 2012 was analysed with the help of econometric model to reach the desired conclusion. It indicates the strength and direction of a linear relationship between two random variables.

Summary Output

	<i>Brent price \$/bbl</i>	<i>OECD demand</i>	<i>Non-OECD demand</i>	<i>OPEC supply</i>	<i>NonOPEC supply</i>	<i>Growth of OECD</i>
Brent price \$/bbl	1					
OECD demand	-0.6498	1				
non- OECD demand	0.9032	-0.85488	1			
OPEC supply	0.7902	-0.4945	0.69843	1		
non OPEC supply	0.8372	-0.8330	0.9446	0.7640	1	
Growth of OECD	-0.1879	0.68024	-0.3806	-0.2052	-0.3095	1

Correlation between Brent price and OECD demand is -0.64, which means Brent price is Negatively related with the OECD demand.

- Non-OECD demand and Brent price is 0.90 which shows they are highly correlated.

OPEC supply and Brent price positively correlated 0.79.

- Non-OPEC supply is 0.83 highly positively correlated with the Brent price.
- Growth of OECD is negatively correlated with the Brent price but this is less significant desired conclusions.

Summary Output

<i>R egression Statistics</i>					
Multiple R	0.94				
R Square	0.89				
Adjusted R Square	0.83				
Standard Error	11.384				
Observations	10				
ANOVA					
	<i>Df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	3	6470.432	2156.8	16.639	0.00256
Residual	6	777.7085	129.62		
Total	9	7248.140			
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>
Intercept	32.317	275.300	0.1174	0.910	-641.3191
non-OECD dd	7.8371	2.828	2.7707	0.0325	0.915
OPEC supply	7.486	3.66	2.0405	0.087	-1.491
Non-OPEC supply	-10.06	8.155	-1.2344	0.263	-30.024

• **Regression Model on Brent Crude oil prices and some of Fundamental factor (Annually):**

In this study, a relationship is established between Brent crude price and statistics of fundamental factors (OECD demand, nonOECD demand, OPEC supply, non-OPEC supply) affecting Brent price. Annually data taken from 2003 to 2012 was analyzed with the help of econometric model to reach the

- R square is 0.89 & adjusted R square is 0.83. Which means model is highly fit. 89% of the variation in the Brent price is explained by the explanatory variables(OECD demand , Non-OECD demand, non-OPEC supply, OPEC supply)
- F state says if critical value < the calculated value the model which we have accepted is fit.

This model is acceptable.

- P stat for OECD demand is 0.032 is significant at 1% level of significance thus this demand is significance on the Brent price.
- P stat for OPEC supply is 0.087 is also significant at 1% level of significance.
- P stat for Non –OPEC supply is 0.26 which means this Non-OPEC supply is not significant .It means non-OPEC supply does not influence the Brent price.

SUMMARY OUTPUT					
<i>Regression Statistics</i>					
Multiple R	0.90				
R Square	0.81				
Adjusted RSquare	0.79				
Standard Error	12.91				
Observation	10				

ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	5913.311	5913.31	35.4401	0.000341
Residual	8	1334.83	166.85		
Total	9	7248.141			
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>
Intercept	-157.568	38.78578	-4.062	0.0036	-247.008
Non-OECD demand	6.227	1.046053	5.9531	0.0003	3.8151

- R square is 0.81 which shows that 81% of the variation in the Brent price is being explained by the Non-OECD demand.
- F stat is significant at 1% that means model is acceptable.
- P stat is 0.0034 is significant at 1% LOS and the no-OECD has significance influence on the Brent price.

SUMMARY OUTPUT

Regression Statistics					
Multiple R	0.790262				
R Square	0.624513				
Adjusted R Square	0.577578				
Standard Error	18.44444				
Observations	10				
ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	4526.561	4526.561	13.30569	0.006516
Residual	8	2721.58	340.1975		
Total	9	7248.141			
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	
Intercept	-405.125	130.9444	-3.09387	0.014802	
OPEC supply	13.9048	3.811941	3.647696	0.006516	

- R square is 0.62 which indicate that model is not highly fit. The 62% of the variation in the Brent price is explained by the OPEC supply.
- F stat is significant at 1%.

- P stat is 0.0065 which is significant at 1% LOS which indicate that OPEC supply is significantly influence the Brent price.

SUMMARY OUTPUT

<i>Regression Statistics</i>					
Multiple R	0.83				
R Square	0.70				
Adjusted R Square	0.66				
Standard Error	16.461				
Observations	10				
ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	5080.313	5080.313	18.74803	0.002512
Residual	8	2167.828	270.9785		
Total	9	7248.141			
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	
Intercept	-682.33	174.3026	-3.91463	0.004452	
non OPEC supply	15.00469	3.465368	4.329899	0.002512	

- R square is 0.70 which means 70% of the variation In the Brent price being explained by the non-OPEC supply.
- F stat is significant at 1%. That means Model is acceptable.
- P stat is 0.002 which is significant at 1% LOS. Which indicate that non-OPEC supply has influence on the Brent price.

Price forecasting of Brent price using Bi-variate regression model

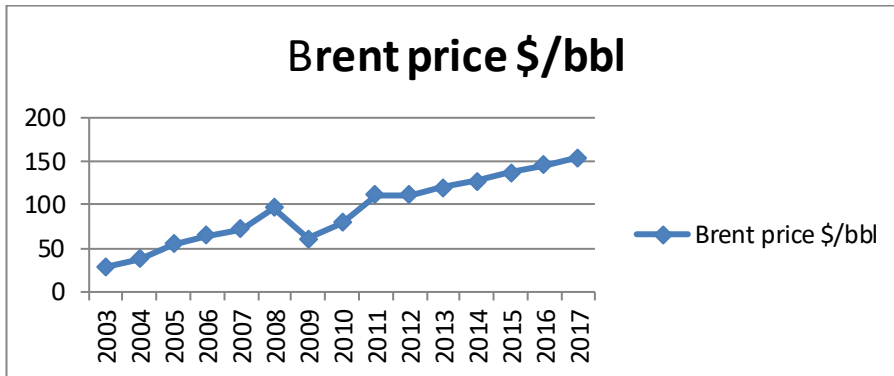
Brent is dependent variable and non-OECD demand is independent variable.

$$Y=a+b*x$$

$$\text{Brent price} = -157.56 + 6.22 * \text{non-OECD demand}$$

- Price of Brent is forecasted on the basis of non-OECD demand because they are highly correlated 0.90.

- Coefficient of non-OECD demand is 6.22 which indicate that if non-OECD demand changes by 1% Brent price will change by 6.22%.



Technical Analysis

The best way we can sum up this analysis is to say this: hopefully we don't see a candlestick chart as a "one stop shop" signal-generating tool. It's not just there to be a robot, chucking out buy and sells signals. It's not as simple as that. It tells us where the market has been and whether this is the result of strong buying or selling, or a change of balance between these two conditions.

We need to treat it as such; it's telling us where a market has been, and if we know what's been going on up until the present, we can at the very least have an idea as to where things may go in the future. If the Australian cricket team has won 18 out of their last 20 test matches there's a good chance they'll do well in the next Ashes series, no?

I find it incredible that traders and money managers can make decisions on a stock or a market without considering the sentiment in the market at the time, and I strongly believe that a chart, especially a candlestick chart, is one of the best ways to get a snapshot of sentiment, and any changes that may be occurring as far as the balance of bulls and bears is concerned.

This study is based on the fundamental as well as technical factors affecting the prices of crude oil .

Fundament factors: Following are the fundamental factors which we need understand to predict and for the better knowledge of how these factors influence the prices of crude oil.

1. Total Demand (OECD + NON OECD COUNTRIES)
2. Total supply (OPEC + NON OPEC SUPPLY)
3. Inventories in the OECD and OPEC countries
4. Spare capacity

5. Geopolitical factors
6. Refining capacity and throughput
7. Research and development in the renewable sources of energy.
8. Economic activity in the developing countries like China, India, Brazil, Arab countries, etc.
9. Spare capacity (production) with the OPEC countries

Technical factors: Following are the technical factors which we have disused earlier in this report and some of them which have maximum effect on the prices of crude oil and natural gas are-

1. Hammer Pattern
2. Dark cloud Cover
3. Shooting star
4. Doji patterns
5. Bearish engulfing pattern
6. Bullish engulfing pattern
7. Evening star
8. Three rising and falling soldiers
9. Momentum analysis
10. Moving average conversions and diversions

The above 9 patterns are most effective in the technical analysis of natural gas and crude oil. I came up with these above patterns after analyzing the around 75 charts from different sources, as it is not possible for me to put all the charts in here.

If such pattern appears on the charts of crude oil and natural gas they have great affect on the prices of crude oil and natural gas.

After the analysis of charts I came up with these 10 factors which are most effective on the prices of crude oil. If one sees such pattern on the chart then he can came up with the trading strategies accordingly. Though there are lots many patterns are there but the above 10 factors have maximum effect on the short term prices of crude oil.

Conclusion and findings

In this study fundamental factor which affects the Brent crude prices like OECD demand , non-OECD demand, OPEC supply ,non-OPEC supply ,economic growth of OECD countries for ten years have been taken .

- After analysis I found that non-OECD demand is highly correlated with the Brent price .
When Non-OECD demand increases the Brent price also increases.
- The Non-OPEC supply and OPEC supply also affects the Brent price but they are not highly significant.
- OECD demand is less negatively correlated with the Brent price.
- Growth of the OECD countries less affect the Brent price.

- Growth of the non –OECD countries positive correlation with the Brent price.
- Brent price has been forecasted using Bi-variate regression model, by taking non-OECD demand with the Brent price, because there is high positive correlation between them.

This report is the result of months of study, research, and practical experience, has hopefully opened new avenues of analysis. After spending some time with candlesticks, I am sure that we will not trade without the insights they offer.

I do not use bar charts anymore, I only use candlestick charts. But that does not mean I only use candlestick indicators. While the candlesticks are a very important medium of market analysis, I use all the technical tools at my disposal. This is the advantage of candlestick charts. With them we can use candlestick techniques, Western techniques, or a combination of both. For experienced technicians we will find the union of Eastern and Western techniques creates a wonderfully electrifying synergy. Be flexible about chart reading. Where we stand in relation to the overall technical evidence may be more important than an individual candlestick pattern. For example, a bullish candlestick signal in a major bear market should not be used as a buy signal. A bullish candlestick formation, especially when confirmed by other technical signals in a bull market, would be a buying point.

Even though many of us will be using this report as a reference, it does not mean each of us will use its candlestick techniques in the same way. So I am not worried that if others learn these ancient investment techniques they will become invalid. This is because candlesticks, as with all other charting methods, require subjectivity.

Two candlestick analysts are like two doctors who went to the same medical school. Each may have the same knowledge about how the body works, yet each doctor, because of his experiences, philosophies, and preferences may give a particular patient a different diagnosis and treat the patient differently--even if the patient's symptoms are the same. The doctor brings his unique personality and perceptions to the diagnosis. So it is with you and technical analysis. You are a doctor of the market. How you read and react to the symptoms of the market's health through candlesticks techniques may not be the same as another candlestick practitioner. How you trade with candlesticks will depend on your trading philosophy, your risk adversity, and your temperament. There are very individual aspects.

In addition, each market has its own unique personality. As the Japanese express it, "The pattern of the market is like a person's face-no two are exactly alike." For example, dark-cloud covers seem to work well in the daily crude oil charts, while hammers appear with relative frequency in weekly copper charts. By analyzing the market's personality, we can uncover the candlestick formations, and variations of these formations, which appear most and work best for that market.

There is a saying, "Fish for me and I will eat for today, but teach me how to fish and I will eat for the rest of my life." I hope that this report has taught us how to do a little fishing. That what we discovered in reading it can be used to unlock some of the secrets of the candle charts.

Based on centuries of evolution, candlestick charts are unmatched in their capacity to be used alone or joined with any other technical tool. This means that each of us, from the technical novice to the seasoned professional, can harness the power of candlestick charts.

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Annexure-1

Year	Brent price \$/bbl	OECD demand	non-OECD demand	OPEC supply	non-OPEC supply	growth of OECD
2003	28.85	49.24	30.62	33.14	48.93	132.54
2004	38.26	50.1	32.48	30.53	47.88	203.41
2005	54.57	50.45	33.64	34.82	48.81	188.66
2006	65.16	50.14	35.01	34.57	49.93	213.48
2007	72.44	50.02	35.91	34.17	50.09	209.97
2008	96.94	48.36	37.2	35.48	49.89	71.43
2009	61.74	46.27	38.46	33.87	50.47	-150.24
2010	79.61	46.83	40.4	34.94	51.87	164.73
2011	111.26	46.45	41.85	35.17	51.91	138.56
2012	111.63	46.01	43.15	36.48	52.98	48.86