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# A study on commodity markets with reference to crude oil and gold

**Karishma Gajendra and J. Gajendra Naidu**

## Abstract

Commodity markets had a dominant presence in global markets ever since the first commodity exchange “Chicago Board of Trade (CBOT)” was established in Chicago in the year 1848, which is one of the largest commodity exchanges in the world. In the second half of the 1980s several developing countries established their own commodity future exchanges. Some of the world’s largest exchanges were established in Brazil and China. Some newly liberalized economies, such as Russia and Hungary, have also setup commodity future exchanges. Commodity exchanges occupy an important place in the world, and it has been estimated that the volume traded on these exchanges are a multiple times those on stock exchanges. Hundreds of commodities trade daily on dozens of exchanges around the world. The amount of commodity trading that occurs in spot, futures, and options markets on these exchanges on a monthly basis is massive, measured in trillions of dollars globally. The size of particular markets, however, varies for different commodities, and some commodity markets see more trading than others do. Crude oil is one of the most necessitated worldwide required commodity. Any slightest fluctuation in crude oil prices can have both direct and indirect influence on the economy of the countries. The volatility of crude oil prices drove many companies away. Therefore, prices have been regularly and closely monitored by economists. Crude oil prices act like any other product cost with more variation taken place during shortage and excess supply. In the short term, price of crude oil is influenced by many factors like socio and political events, status of financial markets, whereas from medium to long run it is influenced by the fundamentals of demand and supply which thus results into self-price correction mechanism. This sustained movement in the northern side underlines some of the fundamental changes in the marketplace. The objective is to analyse the return on price and volume of crude oil and gold. An attempt is made to study the Causal relationship between the two and examine the direction of the Causal relationship between them, the following tools have been employed for the analysis of the data. Moving Average, Augmented Dickey-Fuller test, Multiple Regression–Phillips–Schmidt–Shin (KPSS) tests, ARMA Model is used.

**Keywords:** Moving Average, Augmented Dickey Fuller test, Multiple Regression, Phillips–Schmidt–Shin (KPSS), ARMA

## 1. Introduction

Globally, commodity markets have occupied a very important place in the economic growth and progress of countries. The concept of organized trading in commodities evolved in the middle of the 19th century.

Chicago had emerged as a major commercial hub with rail roads and telegraph lines connecting it with the rest of the world, there by attracting wheat producers from mid-west to sell their produce to the dealers and distributors. However, lack of organized storage facilities and the absence of a uniform weighing and grading mechanism often confined the producers to the dealer’s discretion.

There was an inherent need to establish a common meeting place for both farmers and dealers to deal in “spot” grain to deliver wheat immediately and receive cash in return, which happened in the year 1848. Gradually, the farmers (sellers) and dealers (buyers) started committing to exchange the produce for *cash in future*. This is how the contract for “futures” trading evolved where by the producer would agree to sell his produce (wheat) to the buyer at a future date at an agreed upon price.

In this way, the farmer knew in advance about what payment he would receive, and the dealer knew about his costs involved. This arrangement was perceived beneficial to both sellers and buyers. These contracts became popular very quickly and started changing hands even before the delivery date. If a particular dealer felt uninterested in having wheat, he would sell his contract to someone else, who needed it. Similarly, the producer who didn’t

intend to deliver his wheat would pass on the responsibility to another by buying new contract. The price of the contract would depend on the price movement in the wheat market depending upon demand and supply.

Commodity markets had a dominant presence in global markets ever since the first commodity exchange “Chicago Board of Trade (CBOT)” was established in Chicago in the year 1848, which is one of the largest commodity exchanges in the world. In the second half of the 1980s several developing countries established their own commodity future exchanges. Some of the world’s largest exchanges were established in Brazil and China. Some newly liberalized economies, such as Russia and Hungary, have also setup commodity future exchanges. Commodity exchanges occupy an important place in the world, and it has been estimated that the volume traded on these exchanges are a multiple times those on stock exchanges. Hundreds of commodities trade daily on dozens of exchanges around the world. The amount of commodity trading that occurs in spot, futures, and options markets on these exchanges on a monthly basis is massive, measured in trillions of dollars globally. The size of particular markets, however, varies for different commodities, and some commodity markets see more trading than others do.

**Commodity Market**

A commodities exchange is an exchange where various commodities and derivatives products are traded. Commodities, which are hard goods, as opposed to services, may be bought and sold on a commodity exchange in three types of markets: cash, futures and options. A commodity exchange is considered to be essentially public because anybody may trade through its member firms. The commodity exchange itself regulates the trading practices of its members while prices on a commodity exchange are determined by supply and demand. A commodity exchange provides the rules, procedures, and physical for commodity trading, oversees trading practices, and gathers and

disseminates marketplace information. Commodity exchange transactions take place on the commodity exchange floor, in what is called a pit, and must be affected within certain time limits. Floor traders, floor brokers and futures commissions merchants working on the floor of a commodity exchange must be registered.

Most commodity markets across the world trade in agricultural products and other raw materials. These contracts can include spot prices, forwards, futures and options on futures. Other sophisticated products may include interest rates, environmental instruments, swaps, or ocean freight contracts. Modern commodity markets began with the trading of agricultural products, such as corn, cattle, wheat and pigs in the 19th century. Modern commodity markets trade many types of investment vehicles, and are often utilized by various investors from commodity producers to investment speculators.

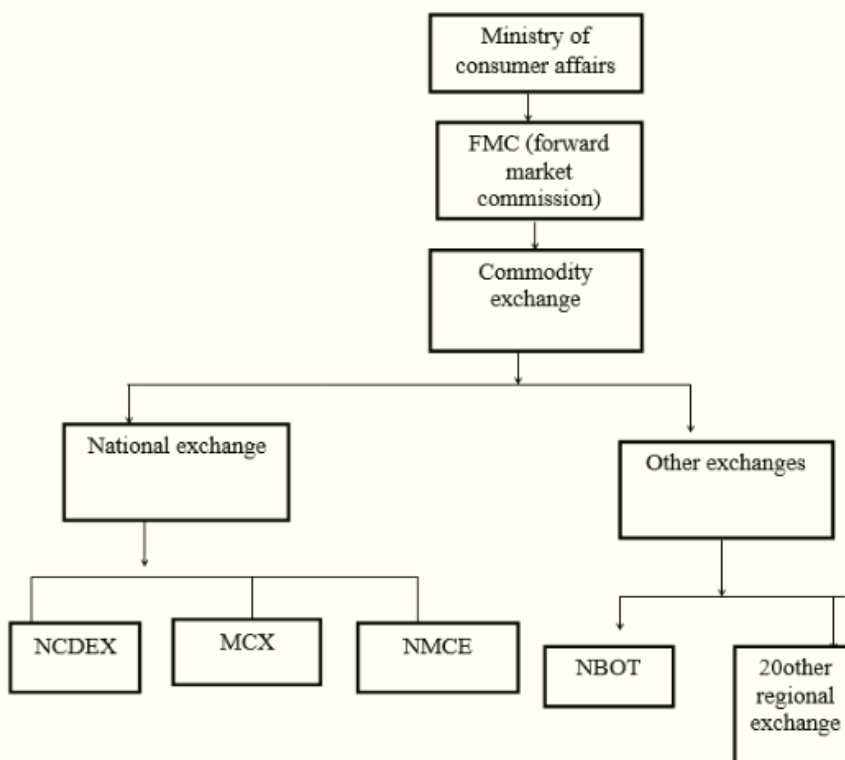
**2. Leading commodity markets of India**

The government has now allowed national commodity exchanges, similar to the BSE & NSE, to come up and let them deal in commodity derivatives in an electronic trading environment. These exchanges are expected to offer a nation-wide anonymous, order driven, screen based trading system for trading. The Forward Markets Commission (FMC) will regulate these exchanges.

Consequently four commodity exchanges have been approved to commence business in this regard. They are:

Sl. No	Commodity market in India
1	Multi Commodity Exchange (MCX), Mumbai
2	National Commodity and Derivatives Exchange Ltd (NCDEX), Mumbai
3	National Board of Trade (NBOT), Indore
4	National Multi Commodity Exchange (NMCE), Ahmadabad

**3. Structure of the commodity market in India**



#### 4. Review of Literature

##### 1. Prashanta Athma and K.P. Venu Gopala Rao (2013)

The author has made an attempt to study the temporal relationship between the Spot and the Futures prices of the Commodity Market by analyzing the data of the Comdex. Various tools like 3 Day Moving Average, Cross Correlation Function, Augmented Dickey, Fuller Test Statistic, Multiple Regression, Johansen Co-Integration Test, Vector Error Correction Model and Granger Causality Test are used to analyze the data. The analysis of the data reveals that the markets are efficient in the price formation and transmission of information between both the markets. The Comdex reveals that the average Futures prices are greater than the average Spot prices due to the fact that the Comdex is a combination of both perishable and non-perishable commodities. The Futures showed the leadership in the markets which is noticed in the CCF plot and is also supported by the Multiple Regression where the Futures had a stronger influence in predicting the Spot prices and similar results were seen in the Vector Error Correction Model and the Granger Causality. The markets are efficient and availability of Comdex for trading can enable the market participants to hedge their risk on a larger canvas.

**2-Jones and Kaul (1996)** tested whether the reaction of international stock markets to oil shocks can be justified by current and future changes in real cash flows and/or changes in expected returns. They found that aggregate stock market returns in the U.S., Canada, Japan and the U.K. were negatively sensitive to the adverse impact of oil price shocks on those economies. From the data collected from 1970 to 1995 they used the GARCH and Granger causality test and argued that investors in stock markets under react to oil price changes in the short run. They concluded that in the postwar period, the reaction of U.S and Canadian stock prices to oil shocks can be completely accounted for by the impact of these shocks on real cash flows alone. In contrast, in both the United Kingdom and Japan, innovations in oil prices appear to cause larger changes in stock prices than can be justified by subsequent changes in real cash flows or by changing expected returns.

**3. Siliverstovs, Hegaret, Neumann and Hirschhausen (2005)** investigated the degree of integration of natural gas markets and their relation to the oil price were explored through principal components analysis and Johansen likelihood-based co-integration procedure for Europe, North America and Japan markets for the period between the early 1990s and 2004. They found in both the analysis a high level of natural gas market integration within Europe, between the European and Japanese markets as well as within the North American market. At the same time, the obtained results suggested that the European and the North American as well as the Japanese and North American markets were not integrated, confirming with the earlier studies that the gas markets were not integrated across continents.

**4. Haesun, Mjelde and Bessler (2008)** studied the relationships among eight North American natural gas spot market prices. The study provided a dynamic picture of daily information flow among natural gas spot markets from 1998 to 2007. The study used the error correction model (VECM) as the basic tool for analysis. Results indicated that

the Canadian and U.S. natural gas market was a single highly integrated market. Further results indicated that price discovery tends to reflect both regions of excess demand and supply. Across North America, Malin Hub in Oregon, Chicago Hub, Illinois, West Texas Intermediate, Henry Hub and Louisiana region were the most important markets for price discovery. Opal Hub in Wyoming was an information sink in contemporaneous time, receiving price information but passing on no price information. Alberta Energy Company (AECO) Hub in Canada received price signals from several markets and passes on information to Opal and the Oklahoma region.

#### 5. The objectives of the study

- To Analyze the Co movement of commodity and Index.
- To Study the causal relationship between the commodity price and the Index.
- To Analyze the Rate of change and price ratio between gold and crude oil.
- To Analyze the Return on price and return on volume of both commodity and index.

#### 6. Methodology

In view of the above objectives the following methodology has been adopted.

**Research design:** The proposed work is based on empirical study and the research is descriptive and explanatory in nature.

#### Sources of Data Collection

Primary Data-Observation and personal discussion with traders.

Secondary data- Information collected from different websites likes Gold World, from various text books, journals, magazines, news Apers and booklets from company. The closing price of the commodity and Index under observation has been taken from websites of [www.fmc.gov.in](http://www.fmc.gov.in); [www.mcxindia.com](http://www.mcxindia.com); [www.ncdex.com](http://www.ncdex.com); [www.fia.org](http://www.fia.org). Since the study is based on secondary sources of information and data relating to closing price of metal and energy Index and crude oil, gold and silver prices have been taken for the last five years.

#### Tools for Data Analysis

To study the Causal relationship between the two and examine the direction of the Causal relationship between them, the following tools have been employed for the analysis of the data.

- Moving Average is calculated and graphical representation for visual analysis of the relationship between both the markets.
- Augmented Dickey-Fuller test Statistic to check for stationarity of data
- Multiple Regression for predicting the dependent variable based on independent variables
- Kwiatkowski-Phillips-Schmidt-Shin (KPSS) tests are used for testing a null hypothesis that an observable time series is stationary around a deterministic trend.
- ARMA Model is used: Autoregressive-moving-average model the model consists of two parts, an autoregressive (AR) part and a moving average (MA) part.

- HAC Test: Heteroskedasticity-Autocorrelation popularly known as HAC Test.
- Correlogram, also known as an autocorrelation plot, is used to plot the sample autocorrelations.

### 7. Limitation of the study

1. The study is limited to only to commodity spot market of gold and crude oil.
2. Data is obtained and analyzed for a short period.
3. It is very difficult to predict correctly the price movement of commodity because market risk is associated with it.

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