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# An analysis of the relationship between gold and crude oil prices

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**Abstract**
This paper attempts to analyze the relationship between gold and crude oil prices. The aim is to find out the character, the determinants as well as the co-movement between the price levels. This paper takes into account the gold and crude oil prices traded in the Multi Commodity Exchange (MCX) between the period 1/1/2010 to 30/10/15. The relationship is analyzed with the help of trend line evaluation. Gold-Oil ratio is calculated as a proportion of gold price to the crude oil price related to time. A correlation test is also conducted to find the strength of the relationship between the prices of the two commodities.

**Keywords:** Gold, Crude oil, Gold-oil ratio, Correlation, MCX

## Introduction
A trend of interconnectivity is evident in the commodity market with the most important ones being Gold and Crude oil. Gold is the oldest precious metal known to man, and it has been valued as a global currency, a commodity, an investment and an object of beauty. On the other hand crude oil is attributed as the “Mother of all commodities” because of its importance in the manufacturing of a wide variety of materials.
The interconnection of the two commodities started in the year 1933, where the crude oil producers of Middle east demanded gold in return of crude oil. Today Gold and crude oil are predominantly quoted in US dollars.
A theoretical and quantitative analysis is made to have an overview of relationship between gold and crude oil. The basic characteristics of products, its global and Indian scenario as well as the factors influencing the market are analyzed in this paper. A trend line evaluation, Gold oil ratio and correlation test are made to find the relationship between these two commodity prices.

## Research Methodology
The sample period for this study is from 1/1/2010 to 30/10/2015. Monthly prices of Gold (MAUc1) and WTI Crude oil (MCGBc1) traded in MCX are obtained from the website www.investing.com. Trend analysis and Correlation are used in this study.

## Objective of the Study
- To provide an overview of Gold and crude oil trade
- To analyze the characteristics of Gold and crude oil
- To analyze the relationship between Gold and crude oil prices

## Overview of Gold and Crude Oil Trade
Gold is the world’s oldest international currency. It is an important element of global monetary reserve. India is the world’s largest market for gold jewelry and a key driver of global gold demand. Indian households hold largest stock of gold in the world. Nearly two-thirds of India’s demand for gold comes from rural areas where jewelry is the traditional store of wealth for millions who don’t have access for formal banking system. The cabinet on 9th September 2015 had approved the introduction of Sovereign Gold Bonds Scheme (SGBS) and Gold Monetization Scheme (GMS) in the union budget of 2015-16.

The Schemes were to monetize the idle gold into economy and to satisfy never ending demand for gold by Indians, without actually holding physical gold. The government's decision to launch these schemes has the potential to translate gold savings into economic investments and make precious metal an integral part of financial system. The gold imports stood at $2.05 billion in September 2015 (Source: Economic times).

Crude oil is the complex mixture of various hydrocarbons found in the upper layers of earth's crust. Crude oil is often called the "Mother of Commodities" because of its importance in making wide variety of other commodities. Crude oil is used in the produce fuel for cars, buses, trucks, airplanes and trains. It is also used in using wide variety of other products like asphalt for roads, lubricants for all kinds of machines, plastics for toys, bottles etc among others. India is now the third largest importer of crude oil after United States and China. Oil imports during August 2015 were valued at US $7357.47 million which was 42.59 per cent lower than oil imports valued at US $12814.77 million in the corresponding period last year. (Source: http://commerce.nic.in/tradestats/filedisplay.aspx?id=1).

**Characteristics of Gold and Crude Oil**

The valuation of gold is very difficult compared to any other financial asset. Gold is similar to a currency like the U.S. dollar or the euro because it is durable, portable, uniform across the world, and widely accepted. But unlike these currencies, gold is not supported by any company or infrastructure. It is similar to other commodities like maize or oil as it comes from ground and has distinct characteristics. But unlike other commodities, price of gold fluctuates independent of its demand and supply. In fact, only about 10% of the world's gold is used in industry: primarily in electronics, due to its conductivity and anti-corrosive properties. The rest of the world's gold is either made into jewelry or held for investment purposes.

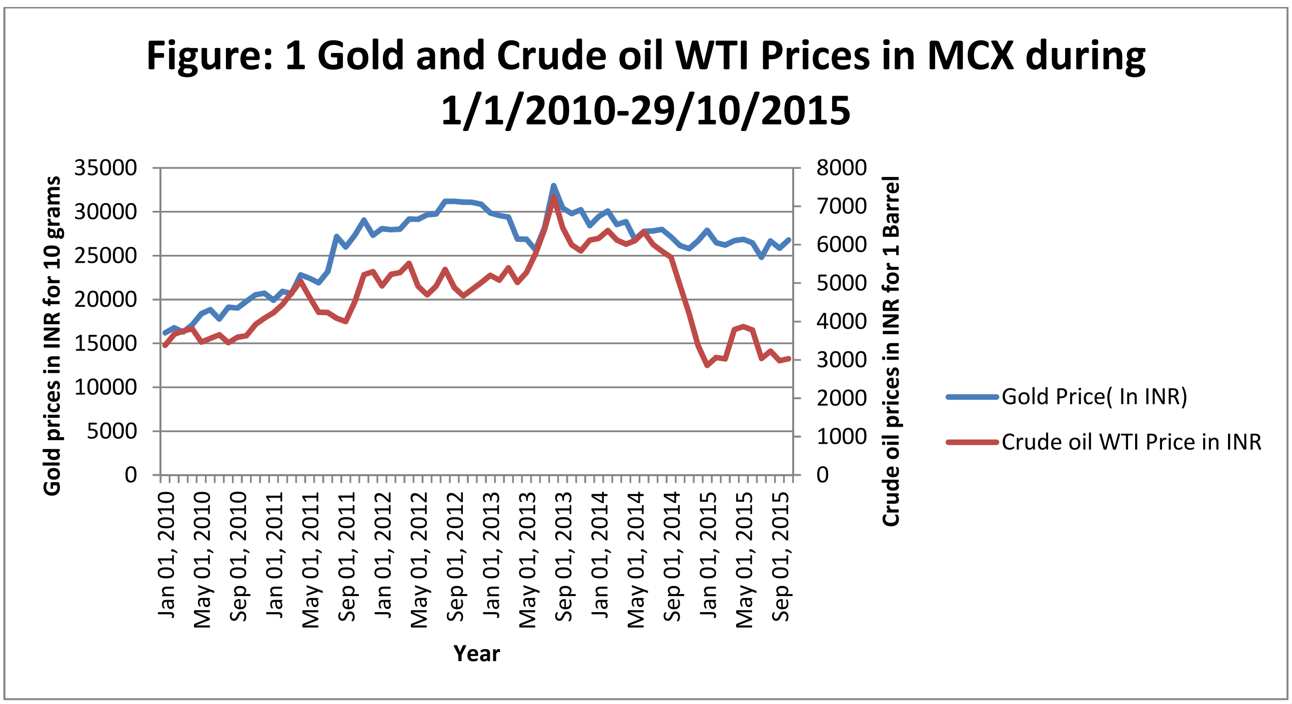
There are many types of crude oil that are produced in the world. They vary in terms of their characteristics & quality. The two most commonly traded types of crude oil are West Texas Intermediate (WTI) and Brent. Crude oil and petroleum products are global commodities and, as such, their prices are determined by supply and demand factors on a worldwide basis. The price of crude oil is the most significant factor determining the prices of petroleum products. This will increase the transportation costs which in turn increases the manufacturing and distribution cost. This will affect the ultimate end price of the product which adds to the inflationary pressure.

**Relationship between Gold and Crude Oil Prices**

For the quantitative analysis of Gold and Crude oil traded in MCX, Price levels are quoted month wise from 1/1/2010 to 30/10/2015. Gold prices are quoted in INR for 10 grams of Gold. Crude oil Prices are quoted in INR for 1 barrel of oil.

**Trendline Evaluation**

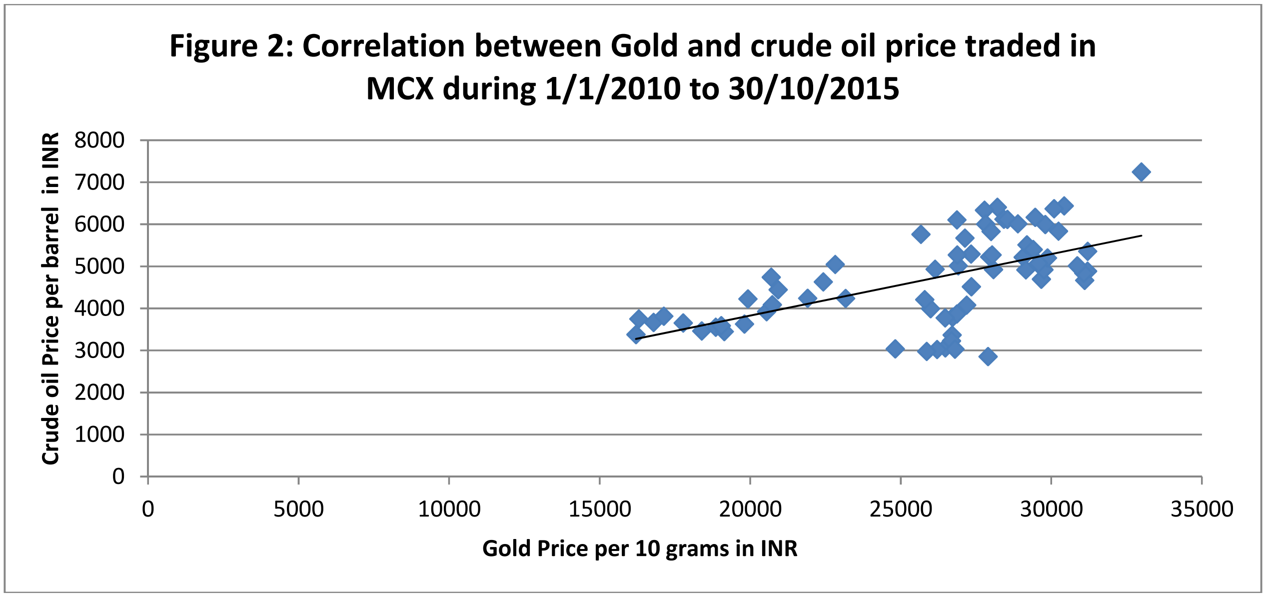
The following figure represents trend line evaluation of Gold and Crude oil for a period between 1/1/2010 to 30/10/2015.




From the figure it is evident that the gold and crude oil prices move in a similar manner. During the year 2013, the prices of both the commodities were high but it declined afterwards. The correlation can again be proved in the following scatter diagram.

**Scatter Diagram**

A scatter diagram is a visualization of relationship between two variables both related to same event.




From Figure 2 it is evident that the both commodities are positively correlated. The degree of correlation can be found out with help of correlation analysis.

### Correlation Analysis

A correlation analysis is a statistical tool that is used to describe the degree to which one variable is linearly related to other.

The result is presented below:

**Table 1:** Correlation between Gold and Crude oil WTI prices (1/1/2010-30/10/2015)

| | Gold Price (In INR) | Crude oil WTI Price in INR |
|---|---|---|
| Gold Price (In INR) | 1 | |
| Crude oil WTI Price in INR | 0.589460962 | 1 |

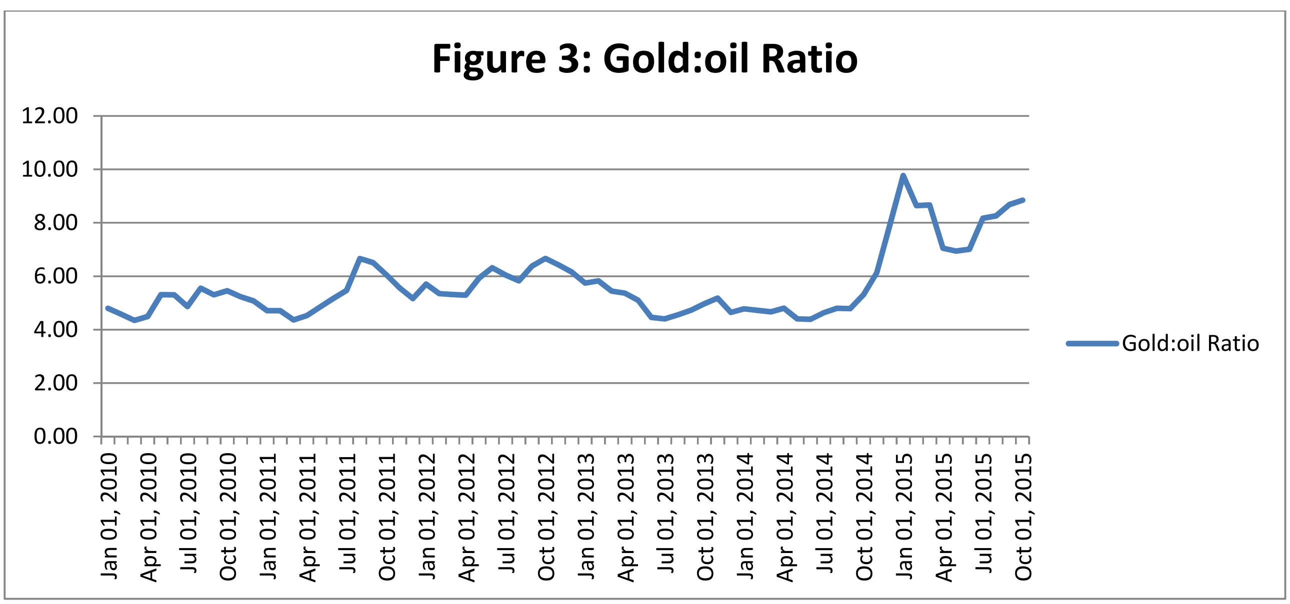
From the Table 1 the degree of correlation if found to be 0.589 which is moderate. So we can conclude that both these commodities have a linear relationship. Their relationship can further be analyzed with the help of Gold-Oil ratio.

### Gold-Oil Ratio

The ratio tells how many barrels of crude oil are needed to buy 10 grams of gold. A rising ratio means more barrels of oil are needed to buy 10 grams of gold. When the ratio is falling, it denotes that oil is becoming more expensive (in relative sense) to gold. By measuring the price of oil against gold will give a valuable perspective on the true values of these commodities as against the currency in which it is normally priced. The Gold oil ratio can be calculated as follows:

Gold Ratio = Price of Gold (per 10 grams) in INR / Price of crude oil (per barrel) in INR

The following figure shows the gold-oil ratio for the gold and crude oil traded in MCX for the period 1/1/2010 to 30/10/2015.



From the figure it is evident from October 2014, gold was becoming more expensive than oil, and it was the highest during January 2015. It may be due to reduction in oil prices during that time. Even though in February 2015, the ratio started declining but it again increased in June 2015 and reached 8.84 in October 2015.

**Conclusion**

From the analysis above it can be concluded that gold and crude oil have a positive correlation. Their inter relationship may be partly because of their valuation in US dollars, as both these commodities are quoted in US dollars in global market. If dollars weakens against rupee, imported items like oil, gold etc will cost more dollars. This may be the reason for their inter relation.

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