AN EMPRICAL INVESTIGATION OF THE CAUSAL RELATIONSHIP BETWEEN THE GOLD PRICE AND THE CRUDE OIL---AN INDIAN SCENARIO

Dr Ashneet Kaur

Assistant Professor, Gitarattan International Business School

Abstract

This research paper focuses on the relationship between Gold Prices and Crude Oil Prices. It focuses on analysing the relationship between two most important commodities which lay down the foundation of the global economy. It also shows the movement of the price levels of both the commodities from 2004 to 2017. Further it also shows the impact of change in gold prices due to the change in crude oil prices. Regression analysis clearly indicates that there is low positive correlation between the two variables. Further to check the autocorrelation, Durbin Watson has been used.

Index Words: Crude Oil, global economy, Gold Prices, Regression analysis, Multicollinearity

1. Introduction

The most valuable metal is Gold for long and its price has been used as the widespread for many currencies also recognised as gold standard. The consumption of gold has increased considerably with strong financial boom and promising moves in gold prices in Nineteen Nineties in the course of liberalization of gold import policy. The gold expenses in India are consistently increasing due to domestic demand primarily based on security, liquidity and diverse portfolio. There would be number factors that have an impact on the prices of the gold. This study aims at understanding and analysing the relationship between the two most important commodities that form the foundation of a global economy and has been the ultimate form of money in six millennia of human history. Where gold is used as hedging device against inflation, in India gold is in particular used in making jewellery for religious and private purposes on the other hand Crude oil and its products are used in distinctive industries for distinct functions. Crude Oil is one of the main sources of strength in the World. Petroleum and its by-products are used to fuel a range of forms of transportation, enterprise and home electrical energy use. Petroleum is also used to manufacture plastics which give merchandise fundamental for each day life. Also, petroleum has helped create many products like cosmetics, tyres (rubber) pesticides etc.

1.1 Relationship between Crude Oil and Gold Prices

Theoretically, Oil and gold are arguably the most important commodities on the planet today. Gold and oil prices tend to fluctuate in the same direction with one another. The reason for the same is:

1. Historically, oil purchases were paid in gold. Even today, a huge proportion of oil revenue ends up invested in gold. As oil prices rise, the increased revenue is utilized in current needs and much of this surplus is invested in gold and other hard assets.
2. With the ever rising oil prices, there is an increase in the inflation level. This has augmented the purchase of gold as it acts as an inflation hedge. Due to the increasing interest rates the rate of return on bank deposits or savings becomes insignificant. Thus most of the central banksacross the globe invests money in gold to stop the devaluation of their reserves.

It is argued that expenses of gold and oil are additionally related with each other. Higher price of oil would translate in greater expenditures of gold. Gold and the crude oil have an inflationary relationship with each other .gold and oil has a relationship with each other through the commodity indices. The crude oil price plays a crucial role in the determination of the price of the gold.

2. Objective of the Study

1. To study the changes of the crude oil prices and gold price

2. To analyse the impact of change in gold prices due to the change in the crude oil prices.

3. Research Methodology

3.1 Data

The research is purely based on the secondary data and the data has been taken from various sources like newspapers, journals, magazines, google scholar etc. The data is collected from the secondary data sources and the trend analysis has been taken from the year 2004-2017 The tool which is used is SPSS (Statistical Product and Service Solutions)

3.2 Hypotheses

Hypotheses which have been used in the research paper

H0: There is no significant relationship between Gold price and Crude oil prices

H1: There is significant relation between the Gold price and Crude Oil Prices

4. Literature review

Singh and Sharma 2017 in their research explained that India is amongst the biggest importers of gold and crude oil. Further they analysed that there is low correlation (0.31) between crude oil and gold. An upward push in crude oil prices is anticipated to similarly make bigger inflation in the economic system while gold is used to hedge towards inflation, we count on some nexus between gold and crude oil prices. They aim to find out the link between gold and crude oil spot prices using cointegration and causality strategy from 1st January 2012 to 31st December 2016. However, gold prices are found to Granger causal crude oil spot prices which imply that changes in gold prices effects the changes in crude oil prices and bear long term causality. The findings of the research are important to the investors, portfolio managers, company houses, crude oil traders, the authorities and coverage makers.

Kanjilal and Ghosh 2017 analyses the dynamic relationship between global crude oil prices and gold price in a two-regime vector error-correction model with a single cointegrating vector and a threshold effect on error-correction. It indicated a lead lag relationship between gold and oil price. The study also focuses that the relationship between gold oil is regime(typical and extreme) independent in both short run as well as long run, thus it remains fluctuating during the entire study.

Alana et al 2017 This paper deals with the relationship between oil prices and gold prices using some recently developed techniques in time series analysis, and based on the concepts of fractional integration and cointegration. We show first, that using standard methods of unit roots and cointegration with integer degrees of differentiation, the two series seem to be individually cointegrated. However, using fractional techniques, we show that there exists a fractionally cointegrated relationship between the two variables, with an order of integration in the long run relationship of about 0.46. Moreover, shocks in the price of gold seem to have an effect on the price of oil that persists in time

Bhunia 2013 investigated the cointegration relationships among crude oil price, home gold charge and chosen monetary variables (exchange prices and stock price indices) in India. Increasing crude oil fees will amplify the production charges which will affect cash waft and will decrease stock prices. Again, trade price fluctuations will have an effect on worldwide trades, consequently impact the stock market. This study is primarily based on secondary data received from a number facts sources consisting World Gold Council database for the length from January 2, 1991 to October 31, 2012. He has used ADF unit root test, Johansen cointegration evaluation and Granger causality. Johansen cointegration test result indicates that there exists a long-term relationship among the chosen variables. Granger causality take a look at end result shows that there need to be both bidirectional and no causality among the variables.

Sindhu 2013 analysed the impact of certain macro economic variables such as exchange rate, crude oil, inflation rate and repo rate on the gold prices individually. She concluded that there exists an inverse relationship between exchange rate and gold price, positive correlation between change in crude oil prices and gold prices.

Chang 2011 conducted the monthly records spanning from Jan-1986 to April-2011 to look at the relationship between the fees of two strategic commodities: gold and oil. He examined the relationship through the inflation channel and their interplay with the index of the US $. Further he used distinctive oil price proxies in his investigation and found that the impact of oil price on gold price is not asymmetric but non-linear. He also proved that there is a long-run relationship existing between the costs of oil and gold and that oil prices can be used to predict gold prices.

Jana 2011analysed the relationship between crude oil price and gold price. She also studied the basic characteristics and the price trends. She concluded that there exists a long term relationship between the two variables with the help of various econometric techniques such as Vector Error Correction Model, Johansen cointegration evaluation and Granger causality

5. Data Interpretation

Change in the value of Gold and Crude Oil Prices

Table: 1   Value of Gold and Crude Oil In The Form Of INR And Changes

Years (2004 – 2017)	Gold value in INR (rupee)	Percentage Change in Gold Price	Crude value in INR (Rupee)	Percentage Change in Crude Oil Price
2004	18936	-	3800	-
2005	23090	22%	3900	3%
2006	27972	21%	2744.36	-30%
2007	32862	17%	4185.58	53%
2008	42374	29%	3317.08	-21%
2009	7424.4	-82%	3259.85	-21%
2010	62847	746%	3636.50	-2%
2011	81304	29%	4219.91	12%
2012	90814	12%	4924.20	17%
2013	74625	-18%	5293.50	7%
2014	75749	2%	6230.50	18%
2015	74083	-2%	4864.75	-22%
2016	78754	6%	4300.00	-12%
2017	82756	e5%	4500.00	5%

The above table shows that from 2004to 2008 there is no noticeable change in the prices of the gold but in there is a major downfall in the year 2009 by 82%. The Global Financial crisis 2008 may be one of the major reasons of the same. There has been a consistent rise in the prices of Gold from 2011 to 2017 which had a favourable impact on the growth of the Indian Economy.

Hypotheses testing

Null   Hypotheses H0   : There is no significant difference between the Crude oil Prices and Gold Prices

Alternate hypotheses H1: There is no significant relation between the Crude Oil prices and Gold prices

Table: 2 impact analysis of crude oil prices on gold price

Model	R	R Square	Adjusted R square	Std. Error of the estimate	R square Change	Change Statistics		Df2	Sig f change	Durbin Watson
						F change	Df1			
1	.643 a	.413	.364	.25737	.413	8.452	1	12	.013	2.223

a. Predictors: (Constant), icrude

a.   Dependent Variable: igold

The relationship between the two variables and the impact of change in crude oil prices which lead to change in the prices of gold can be studied with the help of correlation and regression. For better results the values collected through the secondary data have been converted into log values and then econometric techniques have been applied.

In the above table R shows the correlation between the dependent and the independent variable that is dependent variable that is gold which is .669 that means there is a positive moderate correlation between the gold price and the crude oil prices.

R square denotes the variation in dependent variable due to independent value. The value of r square is .448 which signifies that 41% of change in gold price is due to the change in the exchange rate. P value tells that whether the model is statistically significant. The P value is .013 which is less than the standard value which is .05 thus the null hypothesis is been rejected. Thus it indicates the significant relationship between the gold price and the crude oil prices.

The Durbin Watson Test is been used as a measure of autocorrelation (also called serial correlation) which can be used in residuals from regression analysis. Autocorrelation is defining as the similarity of a time series over successive time intervals. It can lead to underestimates of the fashionable error and can motive you to assume predictors are considerable when they are not.

Further we also calculated the Durbin Watson which is use to check the autocorrelation among the variables. If the value is between 1.5-2.5 then there is no autocorrelation. In the above table the value is 2.23 which show there is no autocorrelation because its lies between the variables that is Gold price and the Crude oil prices.

Table: 3 **Unstandardized and standardized Coeffecients of crude oil**

Model	Unstandardized Coefficients		Standardized Coefficient Beta			Collinearity Statistics	
	B	std.Error		T	Sig	Tolerance	VIF
(constant)	3.677	.659		5.580	.000		
Lcrude	-.550	.182	-.657	-3.018	0.11	1.000	1.000

a.   Dependent Variable: lexc

The model can be represented and summarized in the form of the below equation

$Y = a + bx$ and the values can be extracted from the above table.

Exchange rate = 3.677+ (-.550) (crude oil)

Coefficient table provide us the necessary information to predict the gold price from the exchange rate as well as it also determines whether the exchange rate is statistically significant to the model or not in the above table the coefficient value has to be determined the value of constant.
 Based upon the coefficient output obtained the value of VIF is 1.000 meaning there is no detection of multicollinearity between the variables .As VIF value obtained between 1 to 10 indicated there is no multicollinearity symptoms.

6. Findings and Conclusion

The research paper mainly aimed at finding out the relationship between gold prices and crude oil prices. It also tries to analyse the impact of change in crude oil prices over the change in the gold prices. The results clearly show a positive moderate correlation between the two variables.
.The consumption of gold has extended notably with robust economic growth and promising moves in gold expenses in Nineties in the course of liberalization of gold import policy. Also the crude oil and gold markets are the major consultant of the giant commodity markets and seem to power the fee of other commodities. Higher fee of oil would translate in higher expenditures of gold. There is no obvious intuitive connection between what occurs with oil and what occurs with gold.

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