

# Relationships between Commodity Market Indicators and Stock Market Index-an Evidence of India

Dr. Amalendu Bhunia

Associate Professor

University of Kalyani, West Bengal, India

bhuniamalendu@gmail.com

---

## Abstract

The present paper explores the relationships between two commodity market indicators and stock market in India using daily time series data of 2<sup>nd</sup> January 1991 – 31<sup>st</sup> December 2012 comprising 5321 observations in the midst of employing Johansen co integration approach and Granger causality method. During the last two decades, both crude oil price and gold price (except 1997-2001) have been increased continuously owing to the panic of the international crises, rupee depreciation, increase in inflation rate, Indian political instability, world economic situation, safe haven in case of gold etc., stock market affected significantly. Indian investors are demonstrating uncase in the stock markets due to continuous rising of gold prices on account of no fear and no future loss. Empirical result points out that there is a presence of steady association between the commodity indicators and stock market index (sensex) in the long-run. This research also shows that there must be either bidirectional or no causality among the variables.

**Keywords:** World crude index, Indian gold price, sensex, multivariate co integration test, pair wise causality test

---

## Introduction

Crude Oil and gold are the two important financial variables to facilitate have conceded huge concern throughout the universe including India because of their rising flows in prices as well as economic uses (Le et al, 2011). During the first era of the New Century crude oil price has been increased globally, consequently, operation cost, fuel cost, transportation cost etc. of the country have been increased and in corollary profit margin has been decreased in a considerable manner. Generally, Crude oil price in India is increased gradually on account of rupee depreciation, disruption of supply from Iran, possibility of war between US and Iran and increase in import bill. Therefore, rising crude oil price enhanced the import bill that influences the current account deficit which ultimately hit the inflation and negatively influences the stock market. There is no direct connection between gold price and stock market. Basically, inflation, interest rates, dollar rates, debt effect, global instability, demand and supply of gold, central bank policy, future market management etc. affect the gold price considerably. Furthermore, financial crisis, high rate of inflation, political instability etc. influences the stock market negatively, then stock market influences the gold market significantly. Decrease in the value of stock price indices in India created a panic to the stock market investors. Then they flocked to the safe haven gold and gold price increased further. Accordingly, crude oil and gold in India have directly and indirectly significantly influence the stock market, for which Indian investors have fear to invest any sum further in the stock market (Kapusuzoglu, 2011;

Yahyazadehfar and Babaie, 2012; Bose, 2005; Dasgupta, 2012). t the same time, owing to global financial distress and stock market crash, foreign investors have also dispassionate to invest in the Indian stock market. As a result, economic growth in terms of GDP in India has been decreased drastically since global financial crises and European crisis. So, stock market research in India has got an enormous anxiety to the researchers, market players, investors and academicians. Keeping in view of this, this paper investigates the relationships between commodity market and stock market in India.

## Review of Literatures

Dasgupta (2012) confirmed in his important study that stock price indices of Bombay stock exchange is exceedingly associated with four macro-economic variables in the short period after using monthly time series data with the application of financial econometrics. He also confirmed in the study that stock price indices of Bombay stock exchange is greatly affiliated with IIP and call option price. Kaliyamoorthy and Parithi (2012) established in their study that Indian stock market is not related with gold market and gold prices have been increased continuously not because of Indian stock market crash.

An important study in the area of finance as well as stock market has been published in Modern Economy Journal by Samanta and Zadeh (2012). They verified the relationships among four important financial variables derived from yearly time series data using cointegration test. Their study illustrated that there is an existence of

---

The current issue and full text archive of this journal is available at <http://aoerj.org/archive/>



Academy of Contemporary Research  
Journal  
V II (III), 126-130, ISSN: 2305-865X  
© Resource Mentors (Pvt) Ltd (Publisher)

Received: April 2013  
Revised: May 2013  
Accepted: June 2013

cointegration affiliation between the selected variables. Taiwo et al (2012) investigated the effect of stock market on crude oil price with few macro-economic variables including GDP growth in Nigeria based on yearly time series data between 1980 and 2010 with the application of econometric tools. They confirmed that stock price index of Nigeria adversely related with crude oil price.

Le Thai-Ha et al (2011) investigated the linkage between two commodity market indicators, namely, gold price and crude price based on monthly time series data from 1986 to 2011 using financial econometrics. Their study showed that two commodity market indicators are closely linked with each other and one of the indicators, crude oil is the prophet to forecast that daily price of gold. Again, another study in this field has been published by Hosseini et al (2011) who established the short-term and long-term connections of the stock market and financial development indicators in India and China separately using yearly time series data between 1999 and 2009. Kapusuzoglu (2011) in his study showed that stock price indices of Istanbul stock exchange were associated with world crude index in the long period and there was bi-directional causal association present between the two indicators after considering 10 years daily data with employing few important econometric tools.

The long-term relationship between BSE and four macro-economic indicators, i.e., exchange rates, foreign exchange reserve, inflation rate and gold price investigated by Sharma and Mahendra (2010) on Indian daily time series data between 2008 and 2009 with the application of linear regression method. Their research work discloses that stock price in India is very much influenced by exchange rate and gold price and prove that gold price can be fluctuated on the fluctuation of the exchange rate. A comparative study between commodity market indicators with exchange rates (because exchange rates influences the commodity market indicators value in a significant manner) and five important countries stock market published by Wang et al (2010) by using daily time series data between 2006 (opening date of February) and 2009 (closing date of February) with the application of financial econometric techniques. They illustrated that US stock price index are not associated with the commodity market indicators in the long period, at the same time stock price index of other four countries are significantly associated with the commodity indicators in the long period. Xiufang (2010) observed the association involving macro-economic indicators including commodity market variable and stock market of one European country and two South Asian countries based on monthly data between 1999 (February) and 2008 (August) with the application of two important financial econometric tools. He confirmed that the stock market of the European country was significant associated with two macro-economic indicators but the stock market of two selected countries were not associated with macro-economic indicators in the long period.

Gilmore et al (2009) in their study showed that stock market index was associated with gold mining company's gold price index in the long period after employing the daily data between 1996 (June) and 2007 (January) with the application of financial econometric tools. They also showed that both the indicators influenced each other in the short period.

Millera and Rattib (2008) investigated the long-term connection between world crude index and stock price index of selected countries based on monthly time series data between 1991 and 2008 using financial econometrics with various structural breaks. Their research work illustrated that stock price index of selected countries adversely related with world crude index because of effervesces.

The subsistence of commodity market and stock market in India are not existed after international financial crises, Indian political condition and the impact of the possibility of war between Iran and US. On these grounds this research work stabs to examine the relationships between rising trend of commodity market and declining trend of stock market in India.

## Materials and Methods

### 3.1 Research design

This research work is based on secondary data only which is collected from BSE database, RBI record and world gold council database designed for 1991 (2<sup>nd</sup> January) to 2012 (31<sup>st</sup> December) with a number of 5321 observations. In the present research work, two commodity indicators, namely, daily world crude index and daily Indian gold price and daily stock market index of Bombay stock exchange (the closing price) have been taken for the selected periods. The entire empirical test has been prepared by using econometric (Eviews 7) software.

### 3.2 Econometric techniques

To analyze, test of stationarity through ADF unit root method, multivariate cointegration method and pairwise Granger causal method have been employed in the present research work.

### 3.3 Hypotheses taken

#### Hypothesis-1

H<sub>0</sub>: Selected commodity indicators and stock market index are not non-stationary.

H<sub>1</sub>: Selected commodity indicators and stock market index are non-stationary.

#### Hypothesis-2

H<sub>0</sub>: Selected commodity indicators and stock market index are not associated in the long period.

H<sub>1</sub>: Selected commodity indicators and stock market index are notably associated in the long period.

#### Hypothesis-3

H<sub>0</sub>: Selected commodity indicators and stock market index are not connected pairwise.

H<sub>1</sub>: Selected commodity indicators and stock market index are considerably connected pairwise.

## Empirical Results and Interpretations

### 4.1 Results of ADF Unit Root Test

Multivariate (Johansen) cointegration test method is very much helpful to find out the cointegration affiliation between the two variables in the long period and it is feasible if the two variables are predictable or stationery in any case. In the present research work, two commodity indicators, namely, world crude index and Indian gold price may be associated in the long period with stock market index of Bombay stock exchange on the stipulation that they are not unpredictable or stationery. For the purpose of stationarity test, the present study us ADF unit root test, both at levels and at 1<sup>st</sup> differences in the midst of hypothesis-1 above.

**Table 1: ADF Test Results (at level)**

Variables	Intercept but no trend			Intercept and trend		
	Test statistics	Critical value (1%)	Prob.	Test statistics	Critical value (1%)	Prob.
Indian Gold price	-1.47	-3.43	0.9807	-1.29	-3.96	0.9137
Sensex	-0.61	-3.43	0.8458	-2.23	-3.96	0.5689
WCI	-0.56	-3.43	0.8566	-2.73	-3.96	0.3606

**Table 2: ADF Test Results (at 1<sup>st</sup> difference)**

Variables	Intercept but no trend			Intercept and trend		
	Test statistics	Critical value (1%)	Prob.	Test statistics	Critical value (1%)	Prob.
Indian Gold price	-20.14	-3.43	0.0000	-20.14	-3.96	0.0000
Sensex	-66.23	-3.43	0.0000	-66.23	-3.96	0.0000
WCI	-73.11	-3.43	0.0001	-73.11	-3.96	0.0001

Table 1 illustrate the ADF unit root test results at level where it confirms that two commodity indicators, i.e., world crude index, Indian gold price and stock market index (sensex) are not stationary at levels because test statistics are more than critical value at 1% level of significant both in the intercept without trend and intercept with trend. On the other hand, Table 2 exemplify the ADF unit root test results at 1<sup>st</sup> difference where it validates that two commodity indicators, i.e., world crude index, Indian gold price and stock market index (sensex) are stationary (mentioned in hypothesis-1 above) at 1<sup>st</sup> difference [I (1)] because test statistics are less than critical value at 1% level of significant both in the intercept without trend and intercept with trend. The unit root test furthermore confirms that stable variance is seen in case of error terms that indicates statistical

dependency, as supported in (Shahzadi and Chohan, 2012).

**4.2 Multivariate Cointegration Test Results**

Since two commodity market indicators and one stock market index are stationary, therefore, multivariate cointegration method in Johansen approach can be applied to detect the cointegration affiliation between the variables in the long period. At the same time, this method can be determined the cointegration vectors. As we know, two likelihood ratios, to be precise, the Trace Test and the Maximum Eigen Value test can resolve the cointegration vectors. At the time of testing, the present research study presupposes linear deterministic trend unrestricted with intercepts without trends on account of using a lag of 1 to 4 at 1<sup>st</sup> differences derived from Swartz Information Criterion (SIC) for the selected commodity and stock market indicators under the study

**Table-3: Result of Multivariate Cointegration Test Unrestricted Cointegration Rank Test (Trace)**

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.0081	53.18	29.80	0.0000
At most 1 *	0.0019	11.86	15.49	0.1633
At most 2	0.0006	2.43	3.84	0.1267

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level

\* denotes rejection of the hypothesis at the 0.05 level

\*\*MacKinnon-Haug-Michelis (1999) p-values

**Unrestricted Cointegration Rank Test (Maximum Eigenvalue)**

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.0081	41.89	21.13	0.0000
At most 1 *	0.0019	9.49	14.26	0.2433
At most 2	0.0006	2.43	3.84	0.1267

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level

\* denotes rejection of the hypothesis at the 0.05 level

\*\*MacKinnon-Haug-Michelis (1999) p-values

Included observations: 5190 after adjustments

Trend assumption: Linear deterministic trend

Lags interval (in first differences): 1 to 4

Table-3 exhibits the multivariate cointegration test results through Johansen approach that gives surety about affiliation between two commodity market indicators and stock market index of Bombay stock exchange in the long period because trace statistics is more than critical value in case of both the likelihood ratio test, that is, the trace test and the maximum eigenvalue test. Therefore, the results of the multivariate cointegration test do not accept the null hypothesis (mentioned in hypothesis-3 above). This test also confirmed the number (two) of cointegration vectors. It is furthermore indicating that two common stochastic trends or a degree of market integration are present there.

**4.3 Results of Pairwise Causal Test**

To determine the causal relationship as well as movement of causation between two commodity indicators and stock market index (sensex), pairwise causal (Granger) test has been utilized in the present study. Table-4 shows the results of pairwise causal test and illustrate that there is no causal relationship exist between one commodity indicator (Indian gold price) and

stock market index (sensex) because the probability is less than 0.5. Table-4 also demonstrates that world crude index is not related by causal way with Indian gold price. It is furthermore more crucial that Indian gold price is not related by causal means with world crude index. In both the cases, the value of probability is less than 0.5 (mentioned in hypothesis-3 above). However, there is bi-directional causal relationship exist between stock market index (sensex) and Indian gold price because the probability is more than 0.5. Moreover, there is also bi-directional causal relationship exist between world crude index and stock market index (sensex) as well as stock market index (sensex) and world crude index for the reason that probability is more than 0.5, shown in table-4. Thus, pairwise causal assertion linking two commodity indicators and stock market index (Bombay stock exchange) indicates that trend in one indicator is not the grounds for trend in other indicator under the study. Therefore, this study may conclude that causal relationship is merely a trend of the selected data under the period of study, as supported in (Awe, 2012).

**Table-4: Results of Pairwise (Granger) Causal Test**

Null Hypothesis	Obs	F-Statistic	Prob.	Decision	Type of Causality
SENSEX ↑ Gold Price	5249	12.1304	8.E-07	Reject H <sub>0</sub>	Bi-directional causality
Gold Price ↑ SENSEX	5249	0.81933	0.4602	DNR H <sub>0</sub>	No causality
WCI ↑ Gold Price	5308	0.41531	0.6693	DNR H <sub>0</sub>	No causality
Gold Price ↑ WCI	5308	2.72004	0.0697	DNR H <sub>0</sub>	No causality
WCI ↑ SENSEX	5241	3.08034	0.0489	Reject H <sub>0</sub>	Bi-directional causality
SENSEX ↑ WCI	5241	18.9605	9.E-10	Reject H <sub>0</sub>	Bi-directional causality

Note: Decision rule: reject H<sub>0</sub> if P-value < 0.05, DNR = Do not reject; ↑ = does not Granger cause.

**Conclusions**

The primary finding of the present study is that selected three financial variables (two commodity market variables, world crude price and Indian gold price and one stock market variable, sensex) are non-stationery time series data that is a signal of the affiliation between the two commodity market variables and one stock market variable in the long period. The empirical results of multivariate cointegration method through Johansen approach point out that secured cointegration connection between the selected variables under the study are very much present in the long period. This research furthermore illustrates that there are bidirectional causal connection present between sensex and two commodity indicators in the study period.

Indian gold price has been increased continuously between 1991 and 2012 owing to increase in the rate of world crude price, increase in import duty, interest rate, current account deficit, high rate of inflation, world economic situation, Indian political condition, increase in gold consumption in India, stock market collapse etc., as supported in, (World Gold Council, 2012). Though India is oil importing country, owing to increase in the import bill, current account deficit and crude oil price also continues to augment in India, as supported in, (Mohamed et al, 2008). As a result, inflation rate was increased in a noteworthy manner in India.

Basically, stock price indices depend on too many macro-economic and financial market factors, for knowing actual picture of stock market in India there is necessitate to consider the factors for which stock market in India are collapsed. This problem may be solved if

exchange rates, inflation rates, interest rates, nifty and Indian GDP growth are considered with this.

**References**

- i. Awe, Olushina Olawale. (2012). "On Pairwise Granger causality Modeling and Econometric Analysis of Selected Economic Indicators", [online] Available: [interstatstatjournals.net/year/2012/articles/1208002.pdf](http://interstatstatjournals.net/year/2012/articles/1208002.pdf), 1-17.
- ii. Dasgupta, Ranjan. 2012. "Long-Run and Short-Run Relationships between BSE SENSEX and Macroeconomic Variables", International Research Journal of Finance and Economics, 95, 135-150.
- iii. Gilmore, Claire G, McManus, Ginette M and Sharma, Rajneesh. 2009. "The Dynamics of Gold Prices, Gold Mining Stock Prices and Stock Market Prices Comovements", Research in Applied Economics, 1(1), E2, 1-19.
- iv. Millera, J. Isaac and Rattib, Ronald A. 2009. Crude Oil and Stock Markets: Stability, Instability, and Bubbles, working paper series, University of Missouri, 1-29.
- v. Hosseini, Seyed Mehdi, Zamri, Ahmad, and Lai, Yew Wah. 2011. "The Role of Macroeconomic Variables on Stock Market Index in China and India", International Journal of Economics and Finance, 3(6), 233-243.

- vi. Johansen, S., and Juselius, K. 1990. "Maximum Likelihood Estimation and Inferences on Co-integration with Applications to the Demand for Money", *Oxford Bulletin of Economics and Statistics*, 52.
- vii. Kaliyamoorthy, S and Parithi, S. 2012. "Relationship of Gold Market and Stock Market: An Analysis", *International Journal of Business and Management Tomorrow*, 2(6).
- viii. Kapusuzoglu Ayhan. 2011. "Relationships between Oil Price and Stock Market: An Empirical Analysis from Istanbul Stock Exchange (ISE)", *International Journal of Economics and Finance*, 3(6), 99-106.
- ix. Le, Thai-Ha and Chang, Youngho. (2011). "Dynamic Relationships between the Price of Oil, Gold and Financial Variables in Japan: A Bounds Testing Approach", Online at <http://mpa.ub.uni-muenchen.de/33030/> MPRA Paper No. 33030.
- x. Mishra, Rabi N and Mohan, G. Jagan. (2012). "Gold Prices and Financial Stability in India", RBI working paper series, Department Of Economic And Policy Research, 2, 1-16.
- xi. Mohamed Abdelaziz, Georgios Chortareas and Cipollini, Andrea. 2008. "Stock Prices, Exchange Rates, and Oil: Evidence from Middle East Oil-Exporting Countries", ASE working paper, 1-27.
- xii. Taiwo, Muritala, Taiwo, Abayomi, Olowookere, Damilare. 2012. "Crude Oil Price, Stock Price and Some Selected Macroeconomic Indicators: Implications on the Growth of Nigeria Economy", *Research Journal of Finance and Accounting*, 3(2), 42-48.
- xiii. Nahid, Kalbasi Anaraki. 2010. "The European stock market impulse to the U.S. financial crisis, *Journal of International Business and Cultural Studies*", The European Stock Market working paper, 1-11.
- xiv. Newey, W. K., & West, K. C. 1987. "A simple positive definite, heteroskedasticity and autocorrelation consistent covariance matrix". *Econometrica*, 55.
- xv. Osterwald-Lenum, M. 1992. "A Note with Quintiles of the Asymptotic Distribution of the Maximum Likelihood Co-integration Rank Test Statistic", *Oxford Bulletin of Economics and Statistics*, 54, 461-472.
- xvi. Rad, Abbas Alavi. 2011. "Macroeconomic Variables and Stock Market: Evidence from Iran", *International Journal of Economics and Finance Studies*, 3(1), 1-10.
- xvii. Samanta, Subarna K. and Zadeh, Ali H. M. 2012. "Co-Movements of Oil, Gold, the US Dollar, and Stocks", *Modern Economy*, 3.
- xviii. Shahzadi, Hina and Chohan, Muhammad Naveed. 2012. "Impact of Gold Prices on Stock Exchange: A Case Study of Pakistan", Working paper series, Karachi Stock Exchange, 10 (2).
- xix. Sharma, Vivek. (2012). "Three critical economic factors that influence the Indian stock market", Money life, [online] Available: <http://www.moneylife.in/article/three-critical-economic-factors-that-influence-the-indian-stock-market/28695.html>.
- xx. Sharma, Gagan Deep and Mahendra, Mandeep. 2010. "Impact of Macro-economic Variables on Stock Prices in India", *Global Journal of Management and Business Research*, 10(7).
- xxi. Šimáková, Jana, 2011. "Analysis of the Relationship between Oil and Gold Prices", *Journal of Finance*, 51(1), 651-662.
- xxii. Le, Thai-Ha, and Youngho, Chang. 2011. "Oil And Gold: Correlation or Causation?", Working Paper Series No. 2011/22.
- xxiii. Wang Mu-Lan, Wang Ching-Ping and Huang, Tzu-Ying. 2010. "Relationships among Oil Price, Gold Price, Exchange Rate and International Stock Markets", *International Research Journal of Finance and Economics*, 47, 80-89.
- xxiv. Xiufang, Wang. 2010. "The Relationship between Economic Activity, Stock Price and Oil Price: Evidence from Russia China and Japan", *International Research Journal of Finance and Economics*, 60, 102-113.
- xxv. Yahyazadehfar, Mahmood and Babaie, Ahmad. (2012). "Macroeconomic Variables and Stock Price: New Evidence from Iran", *Middle-East Journal of Scientific Research*, 11 (4), 408-415.