A STUDY ON VOLATILITY OF NON AGRICULTURAL COMMODITY PRICES WITH RESPECT TO BSE SENSEX

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Abstract

A Stock market and commodity market are the two main pillars of financial system of any country. Developing countries like India and china require huge investment in commodities such as steel and oil to build their infrastructure, cotton and metals to boost their manufacturing sector, and food related commodities to feed their growing population. These trends have created heavy demand for commodities and in turn high prices of commodities. High demand and prices have attracted many investors towards commodity market who were formerly used to invest only in stock and bond markets. Always it has been an area of interest for researcher to investigate between stock market prices and commodity market prices to identify the relationship between them.With this background we have undertaken a study to analyze the volatility of non agricultural commodity prices with respect to BSE sensex to understand the co movement between commodity prices and BSE sensex. The standard deviation, correlation and betas were calculated to understand the risk and co movement between commodity prices and BSE sensex. The study found that correlation between commodities and BSE sensex are negative for the period. This finding again proves the existing literature which says the commodity market and stock markets are negatively correlated and they move in opposite direction.

Key words :BSE Sensex, Commodity market, Beta, standard deviation, risk, co movement, correlation.

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JEL classification: I32, P10, R21, R12

Introduction

Stock market and commodity market are the two main pillars of financial system of any country. Stock market facilitates the buying and selling of shares and commodity market facilitates the trading in commodities. Commodity market plays a vital role in the development of the economy. Developing countries like India and china require huge investment in commodities such as steel and oil to build their infrastructure, cotton and metals to boost their manufacturing sector, and food related commodities to feed their growing population. These trends have created heavy demand for commodities and in turn high prices of commodities. High demand and prices have attracted many investors towards commodity market who were formerly used to invest only in stock and bond markets. The commodity prices also affect the share prices of the company. Whenever the commodity becomes inexpensive the companies can purchase their raw materials and other commodities at lesser prices which in turn reduces their cost of production which lead to low prices of their final products ,more demand for their products and which increases their earnings and the stock prices of the company. On the other hand if the commodity prices increases the companies cost of production increases due to high prices of raw materials which in turn lead to high prices of their final products, low demand, low profits and decrease in the share prices of the companies. Thus we can say there is a strong relationship between operations of commodity market and stock market. With this background we have undertaken a study to analyze the volatility of non agricultural commodity prices with respect to BSE sensex to understand the co movement between commodity

prices and BSE sensex. The standard deviation, correlation and betas were calculated to understand the risk and co movement between commodity prices and BSE sensex.

2. Objectives of the study

1. To understand the relationship between commodity market and stock market.

2. To study the volatility of non agricultural commodity prices with respect to BSE Secsex.

3. To study the co movement between selected non agricultural commodities and BSE Sensex.

4. To compute the risk of selected Non agricultural commodities and BSE Sensex.

3. Research methodology

The descriptive method of research was adopted for the study. The study was mainly based on secondary sources of information which was collected from BSE and MCX commodity market websites. The six actively traded non agricultural commodities like Gold.Silver,Copper,Aluminium,Crude oil,Natuaral oil were selected for the study with respect to BSE sensex. The BSE Sensex and non agricultural commodities monthly prices from January 2011 to January 2017 were used for analysis of data. From these monthly prices the monthly returns were computed. Then these returns were used to compute Standard deviation, Beta and correlation among sensex and non agricultural commodities using MS Excel.

4. Review of Literature

Giradri(2015) studied about correlation of agricultural prices with stock market dynamics and found that the correlation between agricultural prices and stock market returns tends to increase during

periods of financial turmoil. The impact of financial turmoil on correlation gets stronger as the share of financial investors in agricultural derivatives market raises.

Zheng(2014) investigated linkage between aggregate stock market investor sentiment and commodity future returns and found that there is negative relationship between investor sentiment and commodity future returns. The author concluded that commodity futures are excellent investment vehicle during stock market pessimism.

Chakrabarthy & sarkar(2010) studied about efficiency of the Indian commodity and stock market with focus on some agricultural product. They concluded that commodity spot market indices and future spot market indices are co integrated with each other. S&P CNX Nifty 50 is co integrated to the other commodity spot price indices. So if the information regarding any one of the index is available, hedging can be done on other commodity indeces.

Lee,Leuthold & Cordies(1985) studied about the stock market and the commodity future markets diversification and arbitrage potential and suggested that commodity futures contracts may be used in conjunction with an equity portfolio to help reduce risk and enhance portfolio returns. Opportunity for portfolio arbitrage between the two indexes are not likely however.

Hemavathy & Guruswamy(2016) have studied about causality and co integration between gold prices and NSE S&P CNX Nifty and concluded that there exists a long run causal relationship between daily gold price and return on NSE. When the gold prices changes then there exist change in the Indian stock market but when there is change in stock market it does not affected the gold prices.
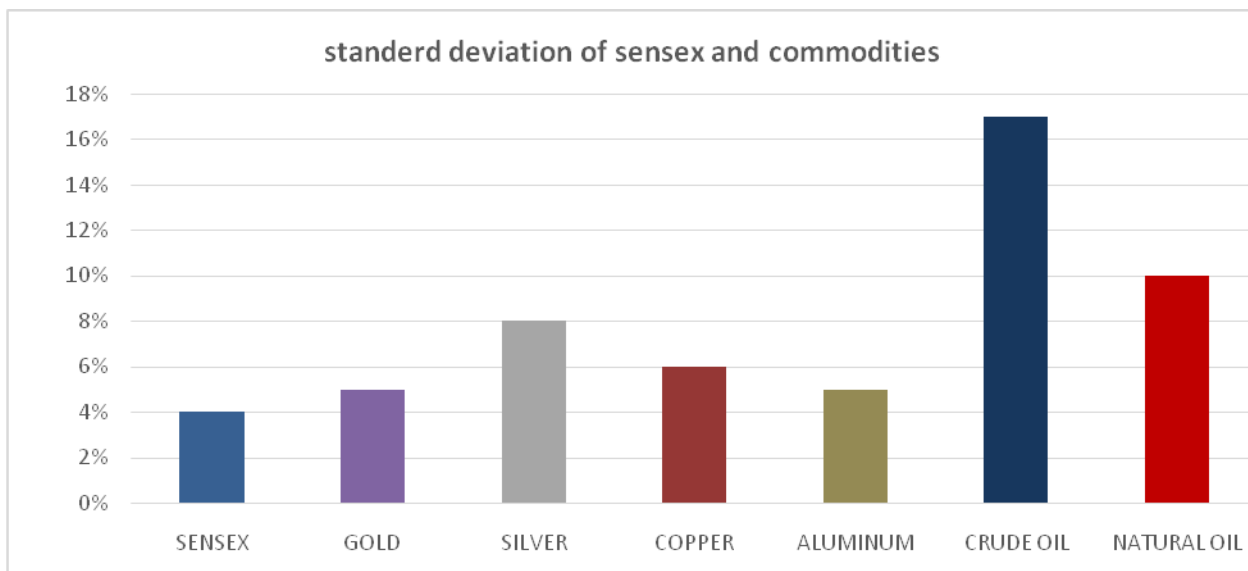
There existed one dimensional relationship between the gold prices and daily NSE S&P CNX Nifty index.

5. Analysis of Data

Table 1: Standard deviation of Sensex and six Commodities from 2011 to 2016

| Commodities	S.D
Sensex	4%
Gold	5%
Silver	8%
Copper	6%
Aluminum	5%
Crude oil	17%
Natural oil	10%

Source:Author

Interpretation:

The SD represents the deviation of actual return from its average expected return and it considers both positive and negative deviation of return from average return. The above analysis shows that highest percentage of SD is 17% which belongs to crude oil and it is highly volatile in returns and the lowest SD is 4% for SENSE which shows less volatility in return. The other commodities like GOLD, and ALUMINUM also has lowest SD of 5% which shows the low level of fluctuations in their returns. For consistency in return it better to invest in Sensex which has lowest risk compared to other commodities.

Table 2: Correlation of Commodities with respect to Sensex from 2011 to 2016

Commodity	Correlation
Sensex	1
Correlation between sensex and gold	-0.1611
Correlation between sensex and silver	-0.1026
Correlation between sensex and copper	-0.2533
Correlation between sensex and aluminum	-0.1019
Correlation between sensex and crude oil	-0.1203
Correlation between sensex and natural gas	-0.0778

Source: Author

Correlaton between sensex and Commodities
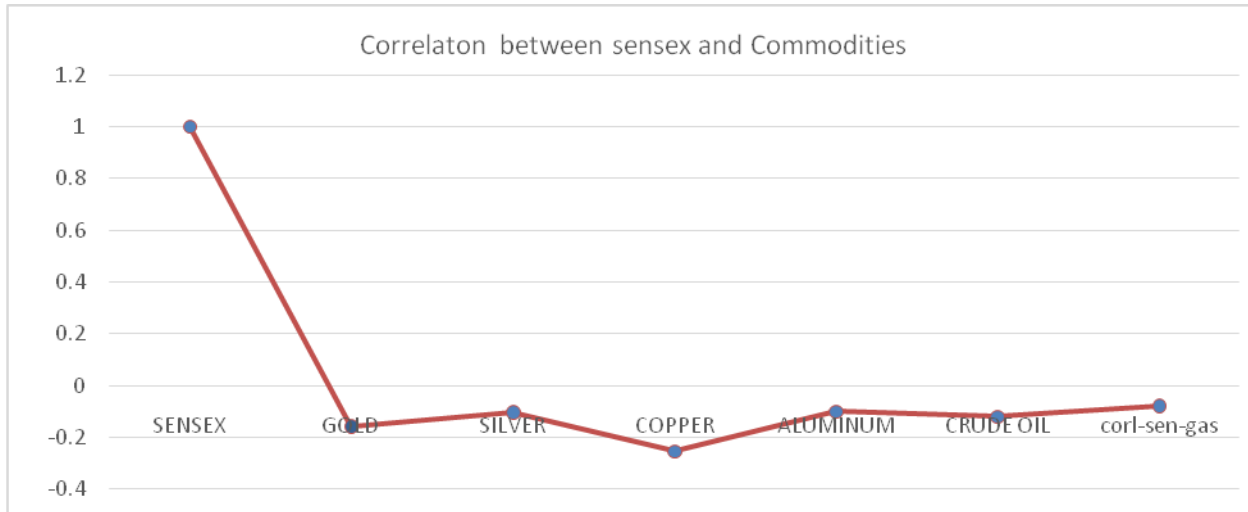
Interpretation:

The analysis shows that every commodity is in negative correlation with respect to sensex and they move opposite to sensex movements. If sensex increases commodity decreases and vice versa. This proves again the fact that stock market and commodity markets are inversely related and equity market is not doing well, commodity market would do well and vice versa. Copper is in more negatively correlated with respect to the sensex. Overall analysis shows opposite moment of commodities and equity stocks.

Table 3: Beta of the Commodities with respect to Sensex from 2011 to 2016.

| Commodities	BETA
Sensex	1
Gold	-0.14146
Silver	-0.05345
Copper	-0.19446
Aluminum	-0.095
Crude oil	-0.03189
Natural oil	-0.03417

Source: Author
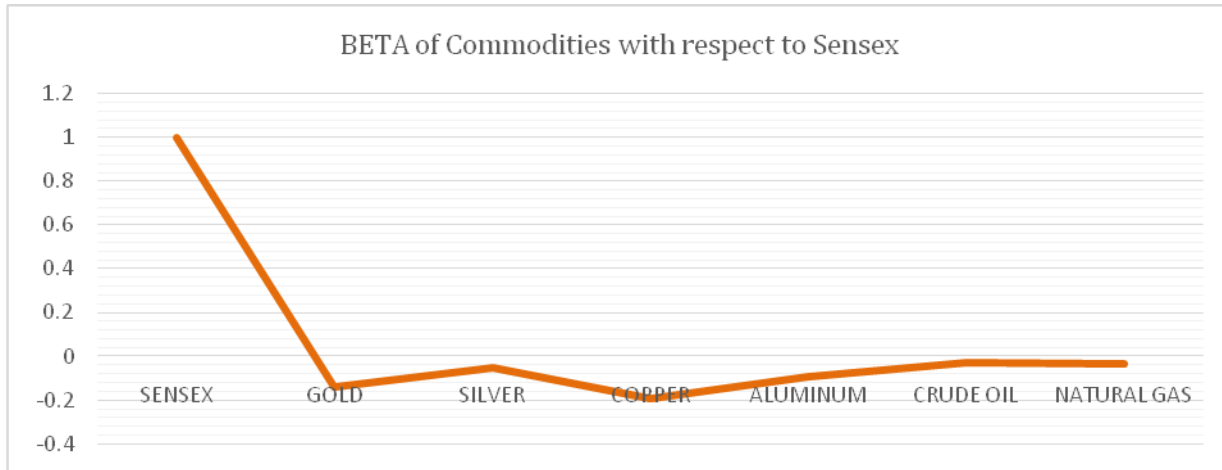
Interpretation:

Beta here means sensitivity of commodities movement to stock index movement i.e sensex. Beta value of Gold is -0.14146 means 10% increase in Sensex lead to 1.4% decrease in gold, Beta value of Silver is -0.05345 means increase in 10% of Sensex lead to 0.5% decrease in Silver. Beta value of copper is -0.19446 means increase in 10% of Sensex lead to 1.9%decrease in copper. Beta value of Aluminum is -0.09500 which means increase in 10% of Sensex lead To 0.9%decrease in Aluminum. Beta of crude oil is -0.03189 which means 10% increase in Sensex lead to 0.3% decrease in crude oil. Beta value of natural gas is -0.03417 which means 10% increase in Sensex lead to 0.3% decrease in crude oil and vice varsa. Negative beta indicates the sensex i.e stock market and commodity market investments are good portfolio combinations which reduces risk for investors as they are negatively correlated.

Table: 4 Correlations between Gold with Sensex

YEAR	2011	2012	2013	2014	2015	2016
CORRELATION	-0.2713	-0.3994	-0.1808	0.13498	0.38251	-0.3342

Source: Author
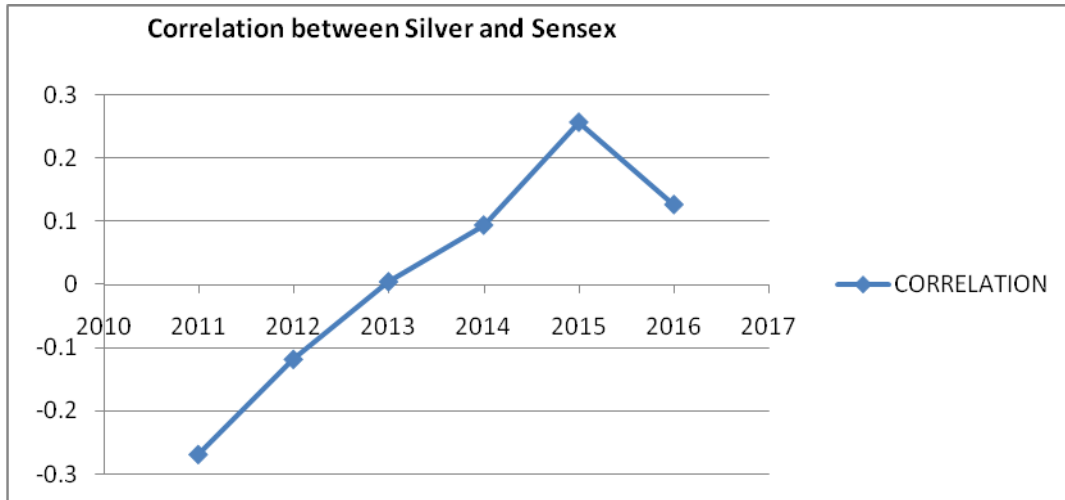
Correlation between Gold with Sensex
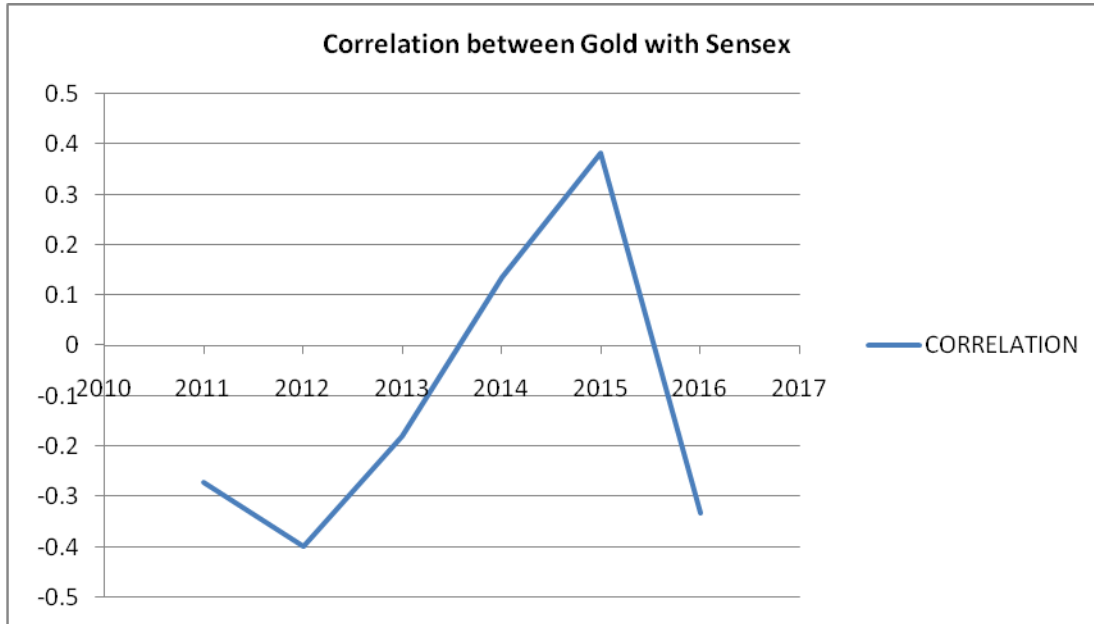
Interpretation:

The correlation between gold and sensex is negative in 4 years out of six years and it is positive in two years that is only in 2014 and 2015. It again proves the already existing literature result that gold and stock market moves in opposite direction and are negatively correlated over a long period of time and this relation vary only for short period.

Table 5: Correlation between Silver with Sensex

| YEAR	2011	2012	2013	2014	2015	2016
CORRELATION	-0.2688	-0.1183	0.00436	0.0939	0.25656	0.1265

Source: Author

Interpretation:

The above table shows that in the year 2011 and 2012 the correlation between silver and sensex was negative which means both of them moved in opposite direction, but from 2013 onwards there was a slight positive correlation between silver and sensex and both of them moved in the same direction.

Table 6: Correlation between Copper with Sensex

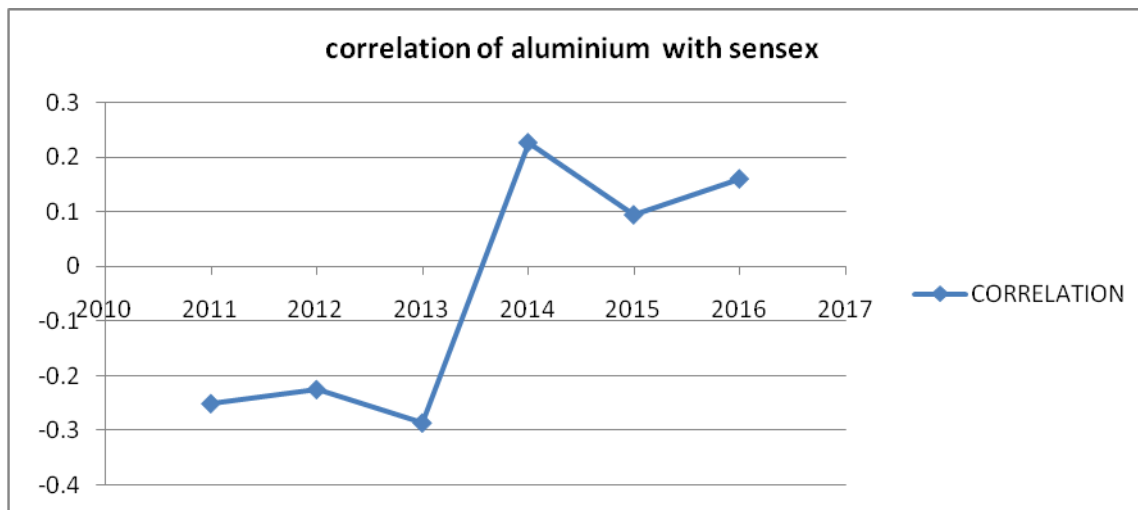| YEAR	2011	2012	2013	2014	2015	2016
CORRELATION	-0.696	-0.5746	-0.0646	0.22575	0.08704	0.1265

Source: Author
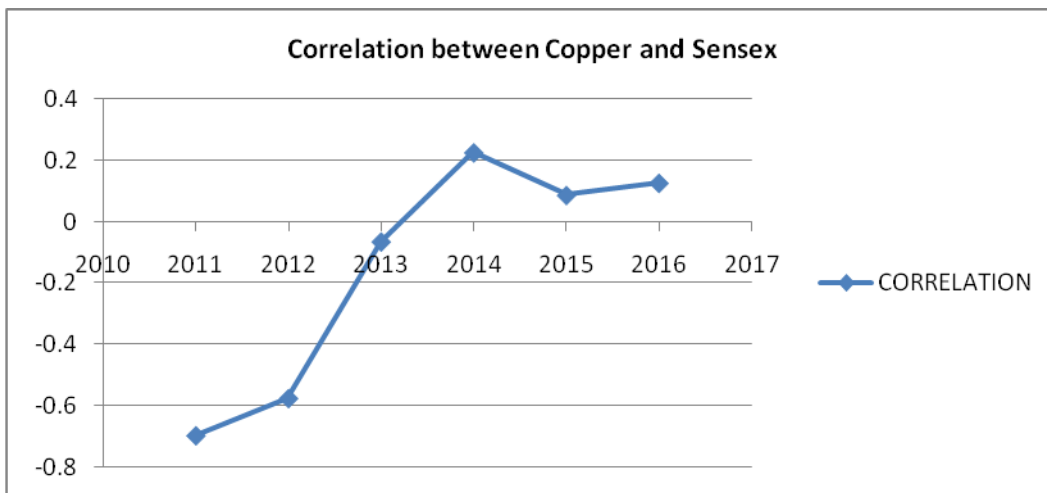
Interpretation:

In   the years 2011 to 2013 the correlation is negative between copper and sensex. But from the year 2014 onwards the correlation between Sensex and Copper became positive that shows movement of prices in the same direction.

Table 7: Correlation of Aluminum with Sensex

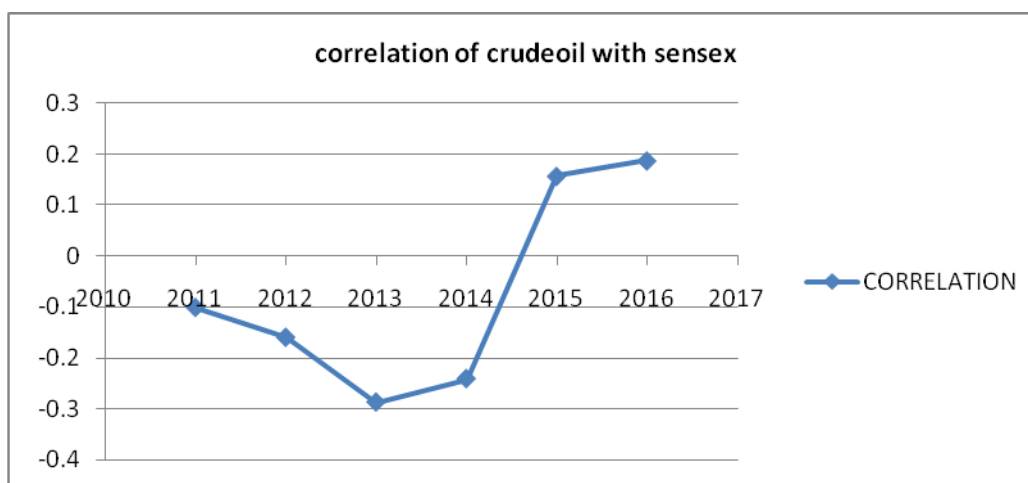| YEAR	2011	2012	2013	2014	2015	2016
CORRELATION	-0.2511	-0.2254	-0.2864	0.22575	0.09397	0.1597

Source: Author

Interpretation:

The correlation between Aluminum and sensex was negative inversely related for years 2011 to 2013

and they became positive 2014 onwards.

Table 8: Correlation of Crude oil with Sensex year wise:

| YEAR	2011	2012	2013	2014	2015	2016
CORRELATION	-0.1009	-0.1597	-0.2873	-0.241	0.15709	0.1876

Source: Author

Interpretation:

As shown in the above table, from the year 2011 to 2014 correlation between CRUDE OIL and

SENSEX was negative that shows inverse relationship. But in the year 2015 and 2016 their existed a

slight positive correlation and they moved together.

Table: 9 Correlation of Natural gas with Sensex yearwise:

YEAR	2011	2012	2013	2014	2015	2016
CORRELATION	-0.4035	-0.3728	0.23917	0.36447	-0.2898	0.0373

Source: Author
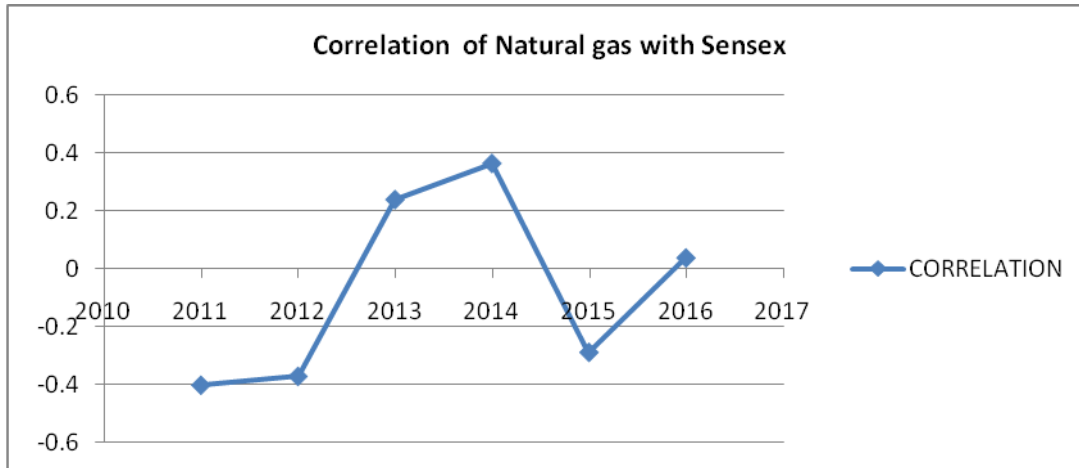
Interpretation:

There existed a negative correlation between Natural gas and sensex in the years 2011 and 2012 but in year 2013 and 2014 the correlation became slight positive but again in the year 2016 the correlation became little positive but close to zero which indicated the natural gas movement was not related with sensex movement for that year.

6. Findings and conclusion

The standard deviation computed for a period of 2011 to 2016 indicates that the crude oil is having17% highest standard deviation which is more risky for investment and more volatile in giving returns compared to other commodities and sensex. The lowest standard deviation is 4% of BSE sensex which means investing on stock market has given stable returns to investors over long period of time. The next lowest standard deviation is of Gold which is also less risky for long term investments compared to other non agricultural commodities .The correlation between commodities

and BSE sensex are negative for the period. This finding again proves the existing literature which says the commodity market and stock markets are negatively correlated and they move in opposite direction. The betas of commodities with respect to sensex are also negative to conclude as the stock market and commodity market returns are negatively correlated these two are a very good combination for investors portfolio construction to build optimal portfolio with good returns and less risk.

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