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ISSN (Online): 2455-7838

SJIF Impact Factor (2015): 3.476

EPRA International Journal of

# Research & Development (IJRD)

Volume:1, Issue:6, August 2016



Published By :  
EPRA Journals

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SJIF Impact Factor: 3.476

EPRA International Journal of Research and Development (IJRD)

Volume: 1 | Issue : 6 | August | 2016

ISSN: 2455-7838(Online)

# ESTIMATION OF COMMODITY VOLATILITY THROUGH BOLLINGER BAND TECHNIQUE: A STUDY ON CARDAMOM AND GOLD PRICES IN INDIA

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## ABSTRACT

*This study estimates the commodity volatility through Bollinger Band technique. The main objective of the study is to estimate the volatility of closing price of cardamom and gold using Bollinger Band. For the study historical price of cardamom and gold were selected from 1-04-2006 to 31-03-2016. Augmented Dickey Fuller Unit Root Test is used for checking the stationary of the price series, Correlation Analysis is used to find the relationship between price of cardamom and gold, and Bollinger Band technique is employed for estimating the volatility of the price of cardamom and gold. The study finally concluded that the closing price of cardamom and gold shows volatility and they have a low degree correlation which suggests that they can be used for the investment purpose.*

**KEY WORDS:** Closing Price, volatility, Augmented Dickey Fuller Unit Root Test, Bollinger Band technique.

**JEL Classification:** G11, G13, G14

## INTRODUCTION

Cardamom and gold are the two important commodities which are used for trading as primary motto and then investment as well as for the purpose of hedging. Both the commodities are traded in a bulk and these two consist of the important commodities among all other commodities for trading purpose in India. India's cardamom is appreciated in the Middle East, Japan and Russia. Especially to the Middle East countries, for them cardamom is the major part of their routine food especially for coffee. Cardamom oil is a precious ingredient in food preparations, perfumery, health foods medicines and beverages. Due to these reasons, the Indian cardamom is a good commodity for the farmers than any other

agro-commodity, which always maintain a good demand in the market and also it gives a fine income to the farmers.

For gold, it is considered as one of the precious metals that can be used as physical investment as well as paper investment. In the case of gold, India stands eleventh position in holding gold around five hundred and fifty seven metric tons.<sup>1,2</sup> Major portion of the gold is in the form of ornaments in temples and individuals. This form of gold won't make any kind of returns and in this scenario. Even from the ancient periods, the kings used gold coins as their dignity with their name and head carved on it, and for the exchange for goods. It was one of the criteria which measures the wealth and power of an emperor. Even the same system is continuing with changed scenario. Every country is

using gold as the reserve for the foreign exchange. Today, gold reserves are under the safe custody of central banks of respective nations for controlling and regulating the economy as a part of monetary policies. The price of gold shows a positive trend for many years and this shows the relevance of investment in gold.

Hence the study is to estimate the volatility of price of cardamom and gold and to determine their correlation for the investment purpose.

## REVIEW OF LITERATURE

**Philip (2003)**<sup>3</sup> has studied the marketing system of pepper and cardamom and to analyse the major influencing factors has found out that the cardamom producers get good remuneration and the cardamom has fine demand in the market. Almost all the farmers are well aware about the domestic as well as international market conditions. **Seetha (2013)**<sup>4</sup> supports his findings through her study which analyzed the trend and growth in area, production and productivity of cardamom cultivation and to ascertain and compare the cost and return structure of small, medium and large sample farmers of cardamom cultivation. She concluded that cardamom cultivation is comparatively profitable venture for all categories of farmers in spite of the high cost of cultivation and the fluctuating nature of cardamom price structure.

The study to identify the short term and long term relationship between spot and future prices of pepper and cardamom done by **Nirupama (2013)**<sup>5</sup> opined that there exist an impact of future price on spot price.

**Anjali and Thomachan (2015)**<sup>6</sup> evaluated the long run relationship between gold price and inflation. Their findings show that there is no long run relationship between the gold price and inflation.

**Duc Khuong (2013)**<sup>7</sup> analyzed the factors affecting the price of gold and concluded that the relationship between gold and stock profit sectors is complex and gold is not a safe haven of market.

On the contrary, the report of **Umesh kumar (2011)**<sup>8</sup> found out that the gold is an efficient portfolio diversifier which also plays a role of a hedge and a safe haven. In terms of volatility, every sector had a certain relationship with gold. He also pointed out that the gold and stock returns are correlated even though in a low degree.

More or less, his conclusion is supported by the study of **Ganghua Mei (2016)**<sup>9</sup>. He tried to explore the linkage between both the returns and volatility transmissions between the U.S. stock market, the world gold market, and the Chinese stock market. He suggested that all active investors should rebalance their portfolio and should hold more gold future contracts.

## STATEMENT OF THE PROBLEM

Cardamom and gold are two important commodities in India for trading as well as investment. Cardamom is one of the profitable crops in India, which is majorly cultivated in different parts of Kerala followed by Tamil Nadu and Karnataka.<sup>10,11</sup> The demand of the cardamom is still increasing because of its quality. It is exported to many countries especially to Arab countries, as it forms the major ingredient for coffee there. Indian cardamom receives a significant demand due to its flavor and taste. This keeps its price more than any other agro-commodities in India.

Another commodity is gold which is used as an ornament, investment and as reserves even from the ancient periods. The trend of this yellow metal is not replaced or changed with the introduction of any other precious metals like platinum and diamond. The price of the gold is ever increasing for the last years. Recently, Prime Minister Narendra Modi has announced three important gold schemes for investment in the form of gold coins, gold monetization scheme and sovereign gold bond.<sup>12,13</sup> All these facts disclose the importance of these two commodities for investment and trading.

Cardamom stands one of the highest price commodities among agricultural commodities and gold is another one among bullion commodities in India. The price of these commodities is fluctuating in a higher manner. This price fluctuation affects the future price of these commodities which influences its spot price. Even this caused a spillover effect on the entire commodity market and the commodity prices.

So the researcher is trying to answer the following objectives:

1. To know whether the cardamom price and gold price is stationary or not.
2. To check whether there is any relationship between cardamom price and gold price.
3. To analyse the volatility of cardamom and gold price.

## METHODOLOGY

The study is fully based on secondary data. The historical price of cardamom and gold is taken from the website [in.investing.com](http://in.investing.com). The data is collected for a period of ten years comprising from 01-04-2006 to 31-03-2016.

Augmented Dickey Fuller Unit Root Test is used for checking the stationary of the price series, Correlation Analysis is used for finding the relationship between price of cardamom and gold, and Bollinger Band technique is employed for estimating the volatility of the price of cardamom and gold.

## ANALYSIS AND RESULTS

**Table 1: Test of Stationarity of Closing Price of Cardamom and Gold**

Commodity	Augmented Dickey-Fuller test			
	Level		1 <sup>st</sup> Difference	
	t-Statistic	Probability	t-Statistic	Probability
<b>Cardamom</b>	<b>-2.773393</b>	<b>0.0652</b>	<b>-9.615587</b>	<b>0.0000</b>
<b>Gold</b>	<b>-1.624229</b>	<b>0.4671</b>	<b>-12.91828</b>	<b>0.0000</b>

Source: Computed Secondary Data

The table 1 shows the Stationarity test of closing price of cardamom and gold. The results fail to reject the null hypothesis of unit roots in their level form. It implies that there is no possibility of the series to be stationary around a constant mean or around deterministic linear trend. Therefore the

first difference of all series is tested for stationary of the series. The results revealed that the closing price of statistics for cardamom and gold is significant at the 1% level indicating the rejection of null hypothesis of the existence of a unit root for each of the price series in their first difference.

**Table 2**

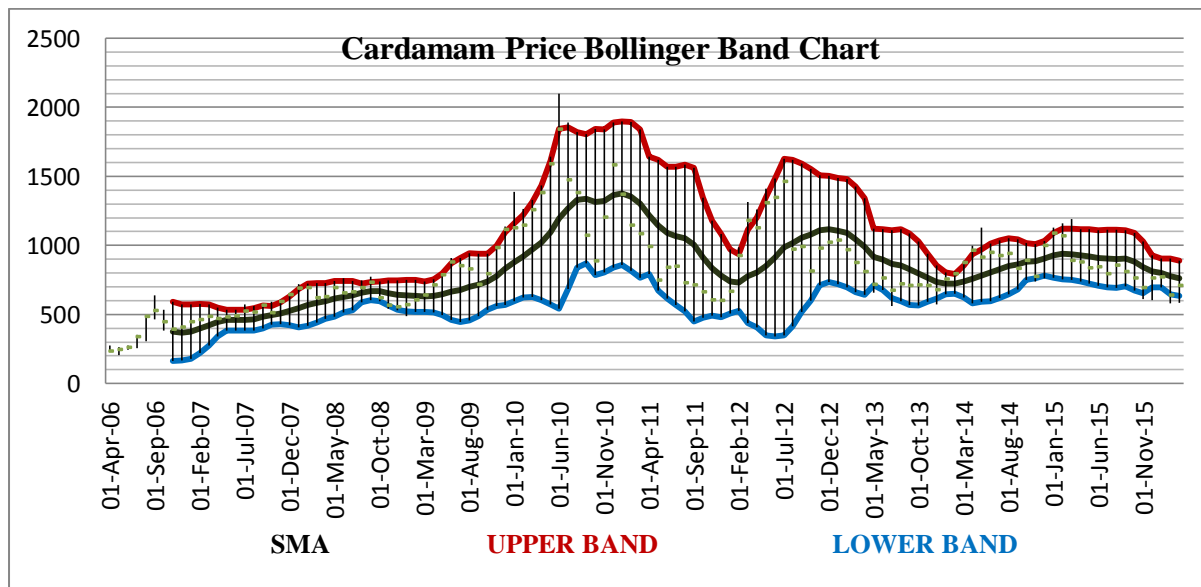
Correlation Analysis		
	Cardamom Price	Gold Price
<b>Cardamom Price</b>	<b>1.000000</b>	<b>0.565281</b>
<b>Gold Price</b>	<b>0.565281</b>	<b>1.000000</b>

Source: Computed Secondary Data

Table 2 shows the correlation between cardamom price and gold price. The analysis shows that there is a moderate correlation between the two commodity prices having a positive value of 0.565. This implies that these two commodities can be

selected for combined investment as if the price of one change in a direction, the price of other will change in same direction but not in the same degree. So these commodities can be used against volatility.

**Figure 1**



The figure 1 shows the volatility of cardamom price using Bollinger band charts. In this technique, the commodity price is plotted and along with it, an upper band, simple moving average and a lower band is also plotted. The chart shows that the price volatility of the cardamom is moderately high. It

starts from the positive trend and then moves to negative trend at last. This movement can be shown in the below figure 2.

Figure 2

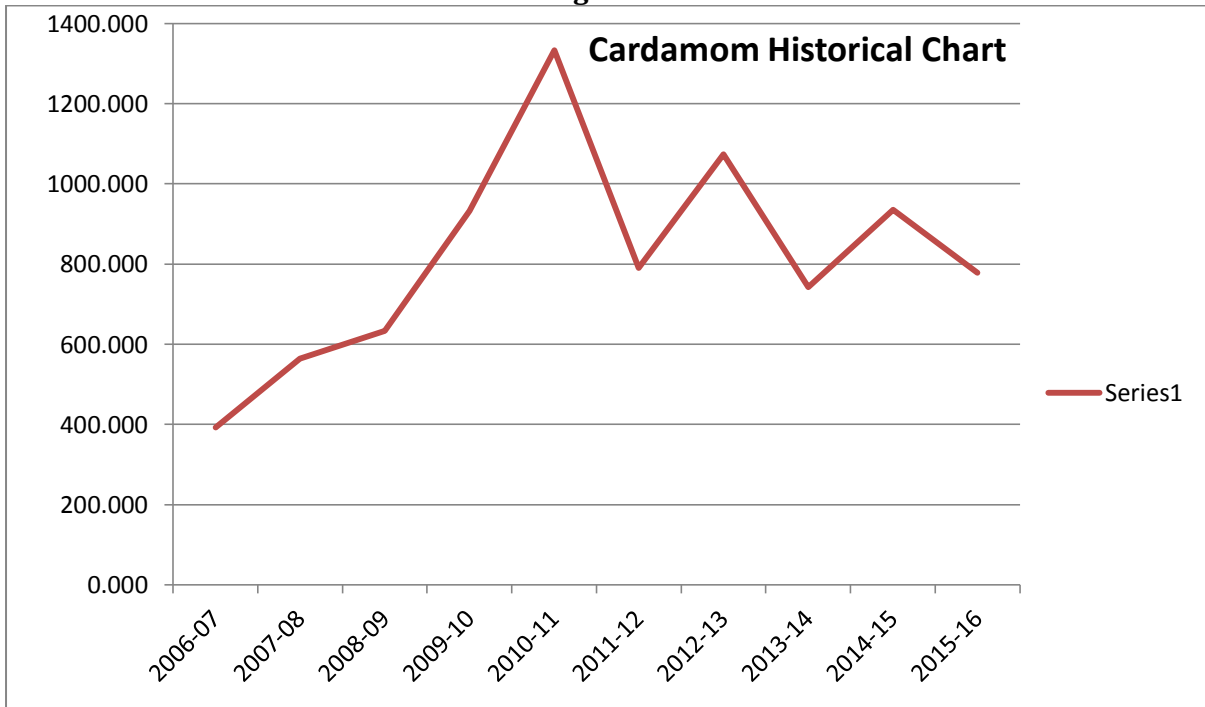


Figure 3

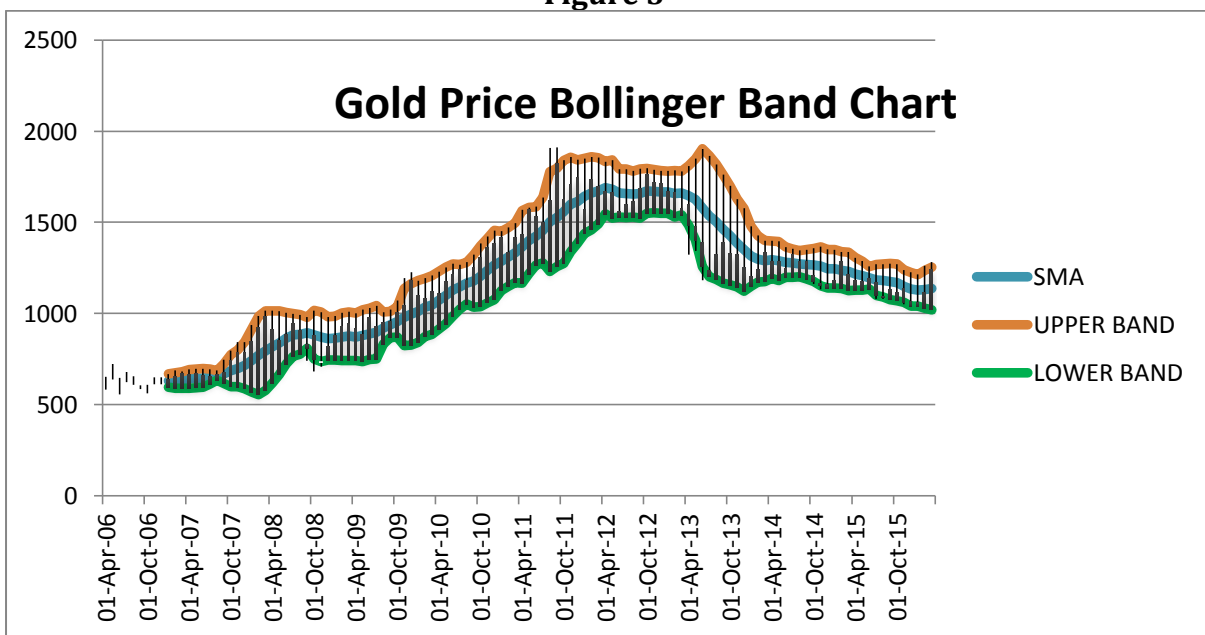
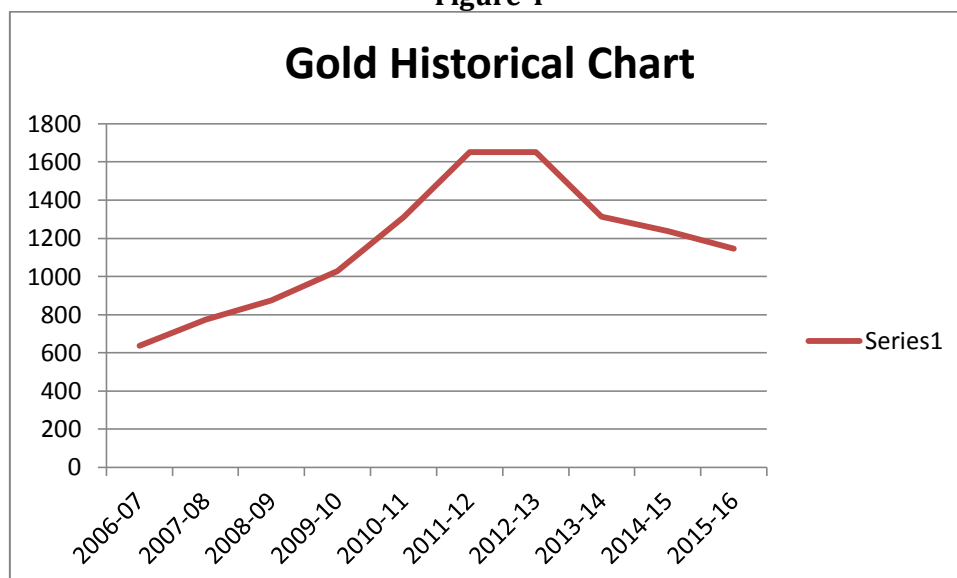


Figure 3 shows the price volatility of gold using the Bollinger Charts. The movement from the chart reveals that the price of the gold shows a negative trend having moderate volatility. It starts increasing

at the beginning and then decreases in the last three years. This movement of price can be depicted in the figure 4.

Figure 4



## CONCLUSION

Cardamom and gold are two important commodities traded in India. The price of these two shows a high fluctuation in the market. So this study analysed the volatility of the prices of cardamom and gold. It also analysed the correlation between these two commodities. The findings of the analysis show that the price of cardamom and gold are fluctuating in a significant manner and they have a moderate positive correlation. It can be concluded that these two commodities can be used for the investment purpose and use as a tool against volatility as they are moderately correlated.

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