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## Arbitrage Opportunities in Spread Trading of Gold Or Silver in Multi Commodity Exchange, India

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### **Abstract:**

Gold and silver are traded in all major commodity exchanges. Different contracts of these underlying assets are traded for different expiry dates in the exchange traded commodity derivatives. Arbitrage opportunities are observed in the price movement of different contracts of the same underlying asset of same quantity expiring in the same month in the same exchange (Multi Commodity Exchange, India). The swing in the difference in the price is the advantage for entry and exit of the contracts in both the legs simultaneously. The study period is taken as Jan – Mar 2014 and Jan – April 2014 for Gold and Silver respectively. The analysis reveals a wide range in this difference make the traders to utilize the opportunity and enjoy the price difference at different point of time before the expiry date. The study reveals though Gold exhibits the wide range in the price differentials, Silver is not having that advantage for the traders. Traders have to identify the pair of the same underlying asset expiring in the same month in the same exchange through correlation techniques.

**Keywords:** Gold , Silver prices, Arbitrageurs, Spread Trading, Open, High, Low and Close prices, Intra commodity, Intra market, Intra delivery.

### **1. Introduction**

Forward contracts were introduced in the international trade probably as early as 2000 BC. It is seen that world's first organized futures exchange was the Dojima rice futures market officially set up in 1730 in Osaka, Japan. Futures in commodities have been around in various forms for several centuries. The futures exchanges set up in Chicago and elsewhere in United States in the nineteenth century are often regarded as the first modern futures markets. Even today, these exchanges are among the largest and most liquid derivative exchanges in the world. Commodities are traded on different exchanges in the world. In India three major commodity exchanges are Multi Commodity Exchange of India (MCX), National Commodity and Derivative Exchange (NCDEX) and National Multi Commodity Exchange of India (NMCE). In India, commodity futures trading and the relevant exchanges are regulated by the Central Government under Forward Contracts (Regulation) Act, 1952 and the Forward Contract Regulation Rules. The Forward Market Commission (FMC), which functions under the Ministry of Consumer Affairs, Food and Public Distribution, regulates the futures market in commodities. The FMC deals with exchange administration.

### **2. Major characteristics of Gold and Silver**

Generally commodity price are affected by the major factors like demand and supply, exchange rate, international trade, Government policy. In the case of precious metals like Gold and Silver, the price fluctuations depend on geo-political tensions, U.S. Dollar with reference to major currencies, global macro economic factors, miner's reports. Above all there is parity between the Gold and Silver prices which also fluctuates over the time. Gold is primarily a monetary asset and partly a commodity. More than two thirds of gold's accumulated holdings relate to value investment with central bank reserves, private players and high carat jewellery. South Africa is the world's largest gold producer followed by US and Australia. India is world's largest gold consumer. Silver is often called as industrial commodity. Demand for silver is built on three pillars; industrial and decorative uses, photography and jewellery & silverware. Peru, Mexico, United States, Australia, China and Chile are the primary producers of silver.

### 3. Types of traders and significance of Arbitrageurs

Traders in the derivatives market are classified under three categories of Speculators, Hedgers and Arbitrageurs. The classification is purely based on the motives of the traders. Speculators are risk-seeking traders who believe they have some specialised knowledge about the market and they try to predict the direction of the market's movement. With this hope, they buy/sell the assets only to sell/buy them back at a later point in time. If their forecast come true, they make money; otherwise they have to bear the losses. Hedgers are risk adverse traders and are just opposite of speculators; they want to reduce the risks normally encountered in their business operations or those associated with the holding of investments. In simple terms, hedging can be understood as something like insurance. Arbitrageurs are set of traders who are on look out for risk-free profits, predominantly interested in exploiting any mispricing between different markets/contracts.

### 4. Opportunity for Arbitrage using the different contracts of same underlying commodity under spread trading

A spread combines both a long and a short position put on at the same time in related futures contracts. The idea behind the strategy is to mitigate the risks of holding only a long or a short position. For example, a trade may have put on a spread in gold. If gold increases in price, the gain on the long position will offset the loss on the short one. If gold were to fall, the reverse would hold. As with any protective trading arrangement, a spread may be vulnerable to both legs moving in the opposite direction of what the trader may have anticipated, losing money. Margin requirements tend to be lower due to the more risk adverse nature of this arrangement.

- Intracommodity: the spread is on the same commodity
- Intercommodity: the spread is on different commodities.
- Intramarket: the positions are traded on the same exchange.
- Intermarket: the legs of the spread trade on different exchanges
- Intradelivery: the contracts mature in the same delivery month.
- Interdelivery: the contracts mature in different delivery months.

As per the above classifications the contracts of Gold and Silver are taken under Intracommodity, Intramarket and Intradelivery which reduces the risk factors widely. In addition to reduced margin requirements, time and labor-saving devices exist for spreads. Most exchanges feature an order entry system that enables a trader to enter or exit a transaction using a "spread order," an order listing the series of contracts that the customer wants to buy and sell, and the desired spread between the premiums paid and received for the options. As per Forward Market Commission circular, the following benefit of margin is given for the spread trading.

- The Exchange will charge 50% of the Initial Margin on the positions in (a) different month contracts on the same underlying commodity and (b) two contracts variants having the same underlying commodity.
- In case of the spread trades additional and special margins shall not be levied.

### 5. Objectives of study

Precious metals such as Gold and Silver contracts are traded in the major commodity exchange MCX in larger volume. It is traded in different contracts expiring almost same date. It is observed there is an almost perfect positive correlation between these contracts of same underlying assets expiring in same date. At the same time it is also observed there is a spread between these contracts which provides the arbitrage between the prices traded at any point of time. There is a convergence and divergence in the spread value over the period of contract. The study is undertaken to see the swing of this variations so that the traders could take advantage of price difference between the different contracts of same underlying assets and enter into the arbitrage transactions.

### 6. Data and Methodology

Secondary data related to 3 months from 06.01.2014 to 31.03.2014 comprising of 61 days is taken for the Gold contracts and 4 months from 01.01.2014 to 30.04.2014 comprising of 84 days is taken for Silver contracts. Initially the correlation coefficient among the Gold and Silver contracts is studied separately to ascertain that there is a positive near perfect correlation to avoid the risk factor. Later the variations in the price relating the various contracts on various dates with reference to Open, High, Low, Close prices of Gold and Silver contracts are studied. Contracts of Gold and silver traded in major Indian commodity market, Multi Commodity Exchange taken for this study purpose.

Underlying Commodity	Quantity	Expiry Date
Gold	1 kg	05.04.2014
Gold Mini	100 gms	04.04.2014
Gold Guinea	8 gms	31.03.2014
Gold Petal	1 gm	31.03.2014
Silver	30 kg	05.05.2014
Silver Mini	5 kg	30.04.2014
Silver Micro	1 kg	30.04.2014

Table1

Comparative study on the Gold and Silver as a separate underlying commodity is done as the spread trading methods. Data analysis for different contracts of Gold for three months period and Silver for four month period Initially the correlation study is carried out for different Gold and Silver contracts for the study period and the observations are given below:

Gold:

Correlation Between			Correlation Coefficient
Gold (1 kg) - (05.04.2014)	Gold Mini (100 gms) - (04.04.2014)		0.99795
Gold (1 kg) - (05.04.2014)	Gold Guinea (8 gms) - (31.03.2014)		0.89317
Gold (1 kg) - (05.04.2014)	Gold Petal (1 gm) - (31.03.2014)		0.84468
Gold Mini (100 gms) - (04.04.2014)	Gold Guinea (8 gms) - (31.03.2014)		0.89713
Gold Mini (100 gms) - (04.04.2014)	Gold Petal (1 gm) - (31.03.2014)		0.85147
Gold Guinea (8 gms) - (31.03.2014)	Gold Petal (1 gm) - (31.03.2014)		0.98978

Table 2

It is observed that there is a scope for the swing in the spread price between the different contracts of Gold as the correlation coefficient is positive and not perfectly positive.

Silver:

Correlation Between			Correlation Coefficient
Silver (30 kg) - (05.05.2014)	Silver Mini (5 kg) - (30.04.2014)		0.99996
Silver (30 kg) - (05.05.2014)	Silver Micro (1 kg) - (30.04.2014)		0.99998
Silver Mini (5 kg) - (30.04.2014)	Silver Micro (1 kg) - (30.04.2014)		0.99998

Table 3

It is observed that there is no scope for the swing in the spread price between different contracts of Silver as the correlation coefficient is perfectly positive. Both the underlying assets are taken for the study to establish that there is a swing in the Gold spread contracts and there is no swing in the Silver spread contracts. Data under different combination of spread contracts in both the underlying asset is measured for Open, High, Low and Close prices to establish the swing in the spread price of each of the pair. Further the maximum and minimum spread under each pair is tabulated for observation. The graphical representation is made for the spread in closing price alone over the given time period.

Gold (1 Kg) and Gold Mini (100 gms)

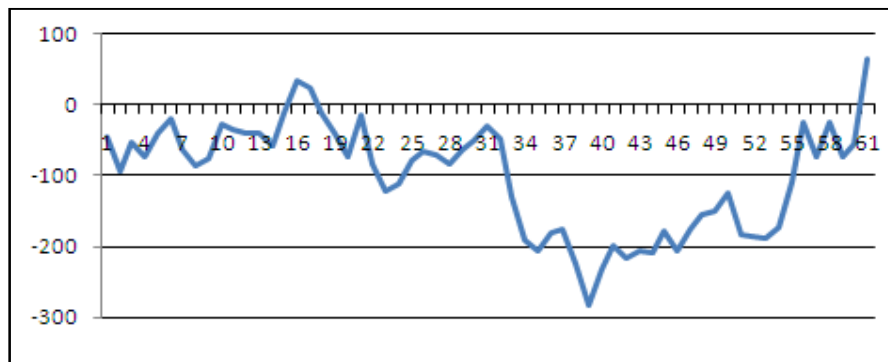


Figure 1

Arbitrage between Gold (1 Kg) and Gold Mini (100 gm) contracts for 3 months

(X-axis – No. of Days, Y-axis – Difference in amount for 10 gms)

(Closing prices are taken for chart purposes)

Difference	Open	High	Low	Close
Max	141	16	51	66
Min	-322	-255	-273	-282

Table 4

Observation: The closing price difference between the contracts for 10 gms swings from Rs. -282 to Rs. 66 and the total value swings between Rs. – 28200 and Rs. 6600 on different time period before expiry date. The trader has to take position for one contract of Gold (1 Kg) and ten contracts of Gold Mini (100 gm) to equalise the quantity under both the contracts.  
Gold (1 Kg) and Gold Guinea (8 gms)

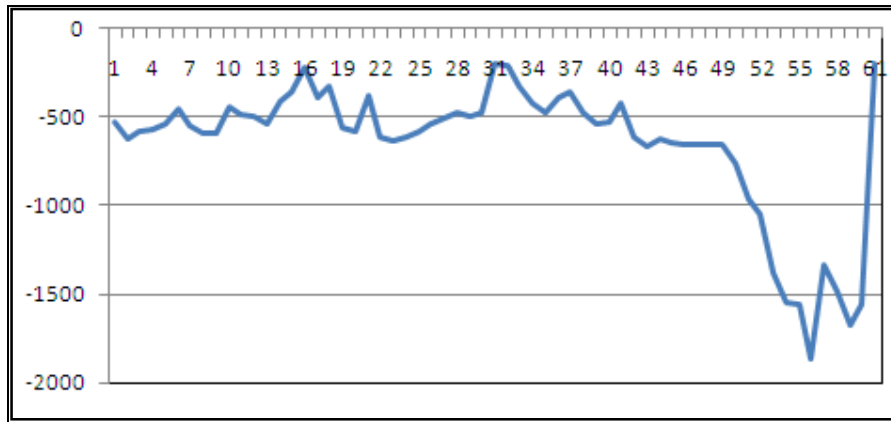


Figure 2

Arbitrage between Gold (1 Kg) and Gold Guinea (8 gms) contracts for 3 months  
(X-axis – No. of Days, Y-axis – Difference in amount for 10 gms)  
(Closing prices are taken for chart purposes)

Difference	Open	High	Low	Close
Max	-242.5	-157	-253.5	-196.75
Min	-1858.75	-2133.75	-1839	-1861

Table 5

Observation: The closing price difference between the contracts for 10 gms swings from Rs. -1861 to Rs. -196.75 and the total value swings between Rs. – 186100 and Rs. 19675 on different time period before expiry date. The trader has to take position for one contract of Gold (1 Kg) and 125 contracts of Gold Guinea (8 gms) to equalise the quantity under both the contracts.  
Gold (1 Kg) and Gold Petal (1 gm)

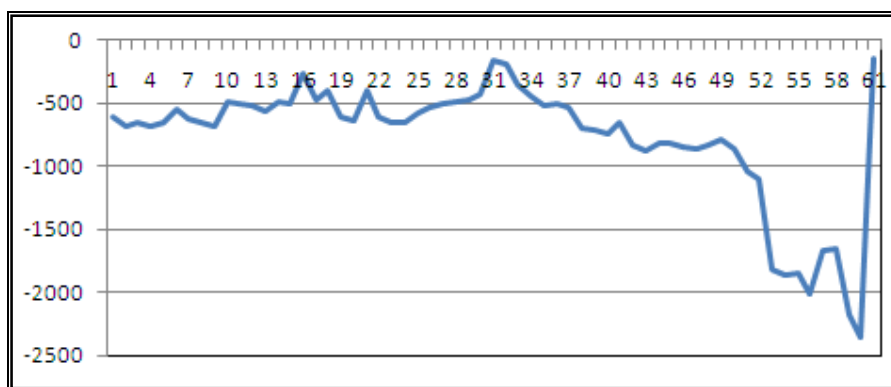


Figure 3

Arbitrage between Gold (1 Kg) and Gold Petal (1 gm) contracts for 3 months  
(X-axis – No. of Days, Y-axis – Difference in amount for 10 gms)  
(Closing prices are taken for chart purposes)

Difference	Open	High	Low	Close
Max	-228	-162	-236	-144
Min	-2240	-2400	-1989	-2360

Table 6

Observation: The closing price difference between the contracts for 10 gms swings from Rs. -2360 to Rs. -144 and the total value swings between Rs. – 236000 and Rs. -14400 on different time period before expiry date. The trader has to take position for one contract of Gold (1 Kg) and 1000 contracts of Gold petal (1 gm) to equalise the quantity under both the contracts. Gold Mini (100 gms) and Gold Guinea (8 gms)

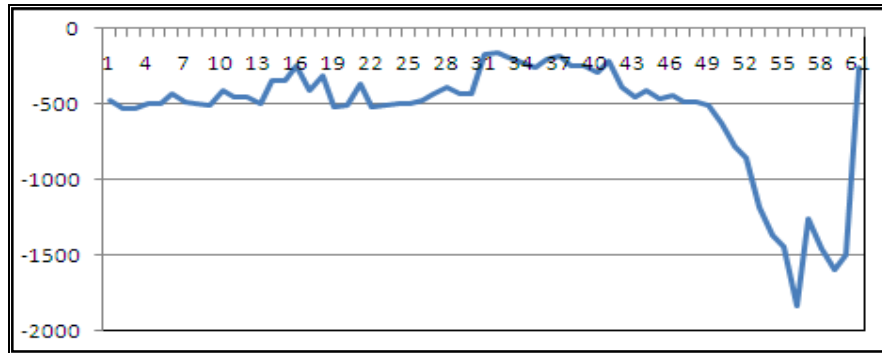


Figure 4

Arbitrage between Gold Mini (100 gms) and Gold Guinea (8 gms) contracts for 3 months  
 (X-axis – No. of Days, Y-axis – Difference in amount for 10 gms)  
 (Closing prices are taken for chart purposes)

Difference	Open	High	Low	Close
Max	-162.5	-129	-188.75	-161.50
Min	-1738.75	-1993.75	-1819	-1838

Table 7

Observation: The closing price difference between the contracts for 10 gms swings from Rs. -1838 to Rs. -161.50 and the total value swings between Rs. – 18380 and Rs. -1615 on different time period before expiry date. The trader has to take position for one contract of Gold Mini (100 gms) and 12 contracts of Gold Guinea (8 gms) to equalise almost the quantity under both the contracts. Gold Mini (100 gms) and Gold Petal (1 gm)

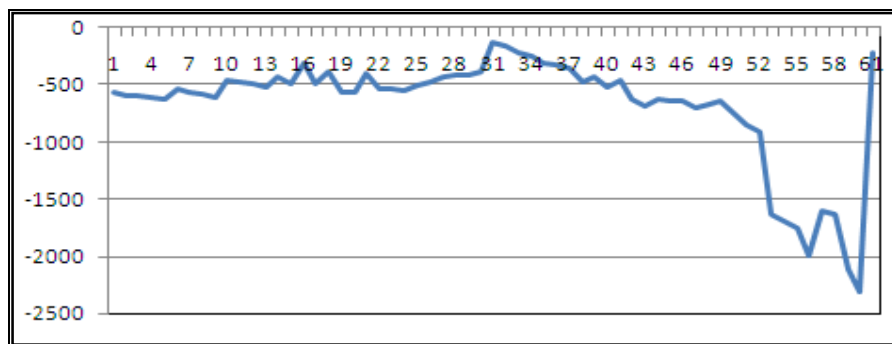


Figure 5

Arbitrage between Gold Mini (100 gms) and Gold Petal(1 gm) contracts for 3 months  
 (X-axis – No. of Days, Y-axis – Difference in amount for 10 gms)  
 (Closing prices are taken for chart purposes)

Difference	Open	High	Low	Close
Max	-160	-122	-198	-124
Min	-2112	-2392	-1969	-2306

Table 8

Observation: The closing price difference between the contracts for 10 gms swings from Rs. -2306 to Rs. -124 and the total value swings between Rs. – 23060 and Rs. -1240 on different time period before expiry date. The trader has to take position for one contract of Gold Mini (100 gms) and 100 contracts of Gold petal(1 gm) to equalise the quantity under both the contracts. Gold Guinea (8 gms) and Gold Petal (1 gm)

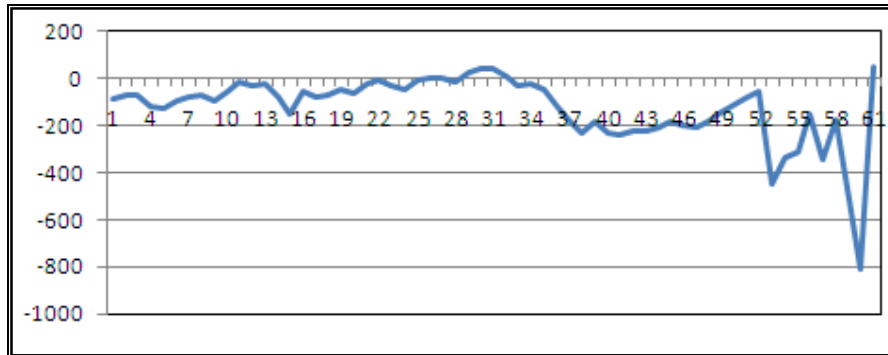


Figure 6

Arbitrage between Gold Guinea (8 gm) and Gold Petal (1 gm) contracts for 3 months  
 (X-axis – No. of Days, Y-axis – Difference in amount for 10 gms)  
 (Closing prices are taken for chart purposes)

Difference	Open	High	Low	Close
Max	107.5	40	83.75	53.75
Min	-656.25	-1043.75	-770	-807.5

Table 9

Observation: The closing price difference between the contracts for 10 gms swings from Rs. -807.5 to Rs. 53.75 and the total value swings between Rs. – 807.50 and Rs. 53.75 on different time period before expiry date. The trader has to take position for one contract of Gold Guinea (8 g) and 8 contracts of Gold petal (1 gm) to equalise the quantity under both the contracts. Silver (30 kg) and Silver Mini (5 kg)

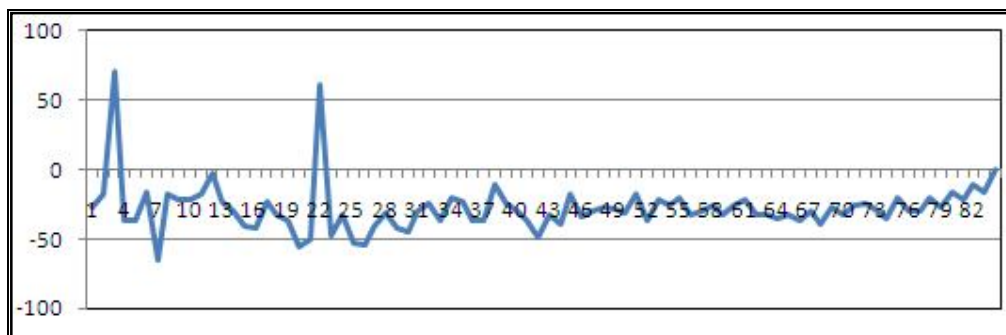


Figure 7

Arbitrage between Silver (30 kg) and Silver (5 kg) contracts for 3 months  
 (X-axis – No. of Days, Y-axis – Difference in amount for 1 kg)  
 (Closing prices are taken for chart purposes)

Difference	Open	High	Low	Close
Min	-312	-286	-151	-65
Max	711	34	525	71

Table 10

Observation: The closing price difference between the contracts for 1 kg swings from Rs. -65 to Rs. 71 and the total value swings between Rs. – 1950 and Rs. 2130 on different time period before expiry date. The trader has to take position for one contract of Silver (30 Kg) and 6 contracts of Silver Mini (5 kg) to equalise the quantity under both the contracts.  
Silver (30 kg) and Silver Micro (1 kg)

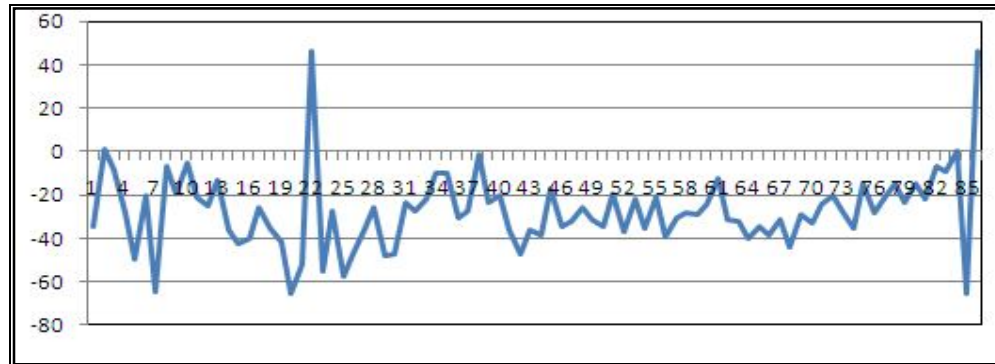


Figure 8

Arbitrage between Silver (30 kg) and Silver Micro (1 kg) contracts for 3 months  
(X-axis – No. of Days, Y-axis – Difference in amount for 1 kg)  
(Closing prices are taken for chart purposes)

Difference	Open	High	Low	Close
Min	-325	-376	-149	-65
Max	806	49	620	46

Table 11

Observation: The closing price difference between the contracts for 1 kg swings from Rs. -65 to Rs. 46 and the total value swings between Rs. – 1950 and Rs. 1380 on different time period before expiry date. The trader has to take position for one contract of Silver (30 Kg) and 30 contracts of Silver Mini (5 kg) to equalise the quantity under both the contracts  
Silver Mini (5 kg) and Silver Micro (1 kg)

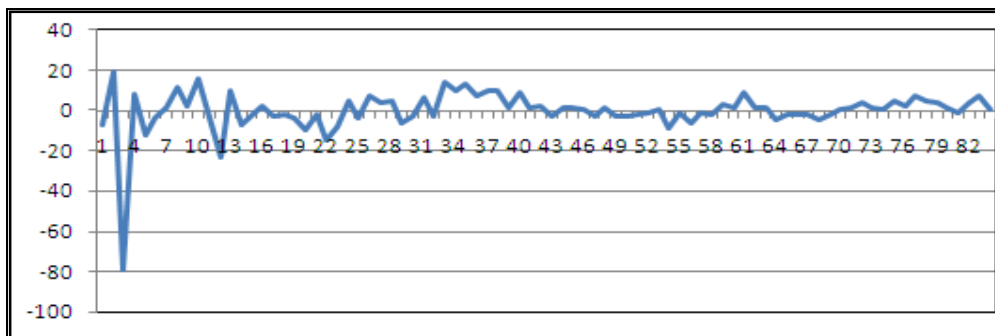


Figure 9

Arbitrage between Silver Mini (5 Kg) and Silver Micro (1 kg) contracts for 3 months  
(X-axis – No. of Days, Y-axis – Difference in amount for 1 kg)  
(Closing prices are taken for chart purposes)

Difference	Open	High	Low	Close
Min	-309	-360	-230	-79
Max	723	254	332	19

Table 12

Observation: The closing price difference between the contracts for 1 kg swings from Rs. -282 to Rs. 66 and the total value swings between Rs. – 395 and Rs. 95 on different time period before expiry date. The trader has to take position for one contract of Silver Mini (5 Kg) and 5 contracts of Silver Micro(1 kg) to equalise the quantity under both the contracts.

### 7. Findings and suggestions

The following price differentials are observed in the study in respect of different contracts of same underlying asset expiring in the same month in the same exchange.

Gold:

Between		Price (Rs.) differential(Swing)	Value (Rs.) differential(Swing)
Gold (1 kg) - (05.04.2014)	Gold Mini (100 gms) - (04.04.2014)	-282 to 66	-28200 to 6600
Gold (1 kg) - (05.04.2014)	Gold Guinea (8 gms) - (31.03.2014)	-1861 to -196.75	-186100 to -19675
Gold (1 kg) - (05.04.2014)	Gold Petal (1 gm) - (31.03.2014)	-2360 to -144	-236000 to -14400
Gold Mini (100 gms) - (04.04.2014)	Gold Guinea (8 gms) - (31.03.2014)	-1838 to -161.50	-18380 to -1615
Gold Mini (100 gms) - (04.04.2014)	Gold Petal (1 gm) - (31.03.2014)	-2306 to -124	-23060 to -1240
Gold Guinea (8 gms) - (31.03.2014)	Gold Petal (1 gm) - (31.03.2014)	-807.50 to 53.75	-807.5 to 53.75

Table 13

Silver:

Between		Price differential(Swing)	Value differential(Swing)
Silver (30 kg) - (05.05.2014)	Silver Mini (5 kg) - (30.04.2014)	-65 to 71	-1950 to 2130
Silver (30 kg) - (05.05.2014)	Silver Micro (1 kg) - (30.04.2014)	-65 to 46	-1950 to 1380
Silver Mini (5 kg) - (30.04.2014)	Silver Micro (1 kg) - (30.04.2014)	-79 to 19	-395 to 95

Table 14

It is clearly established that there is a wide scope of arbitrage in the case of different contracts of Gold where the trader could enter in to simultaneous buy and sell of two different contracts and close those contracts whenever the trader finds the profit booking due to the convergence and divergence of difference in price. In order to mitigate the risk it is necessary for the trader to study the price movement over the period and take a calculated risk at the minimum level so that the profit can be booked at the appropriate time. With the provision for lesser margin for spread trading as announced by the exchanges, it is all the more convenient for the traders in respect of money management. The risk reward ratio in this type of trading will be better compared to other type of trading under speculation. The only limitation to this type of spread trading is liquidity in different contracts and execution of exit and entry orders simultaneously to catch up the required spread instantaneously.

### 8. Conclusion

With more and more market participants enter into the commodities market, it is necessary for the traders to approach their trading strategies keeping in mind the calculated risk and higher returns in their market operations. As the liquidity and volume of the contract increases it is imperative that more and more strategic trade management techniques can be visualized by the traders. In this respect traders are to be better equipped with the knowledge and continuous education in this arena. Sophisticated tools in placing orders and monitoring their positions become all the more important under these circumstances. Indian commodity market has to go a long way in bringing different derivative products, technology and risk management to protect the interest of the traders in this segment. This will not only facilitate the smooth functioning of operations by the market participants, but also pave way for more participation from the farmers, producers and consumers. This will definitely enable the price discovery and risk transfer mechanism to the larger extent in the commodity derivative market.

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