

## **CHAPTER 2**

### **CONCEPTUAL FRAMEWORK**

Commodities and Commodity market are a very important part of a nation's economic development. "Any good which has a physical trait or characteristics is called as a commodity. The word commodity is derived from the French word "Commodité", which refers an item of utility that tenders some convenience or useful service" (Fortnalis, 2014). While driving through the oil fields of western coasts of Gujarat, you can see an important commodity being drained out: - Oil. If you are passing through the wheat fields of Punjab, then you are passing an agricultural commodity: wheat. While admiring a gold necklace in a jewellery store, you are taking a glance through a commodity being traded: Gold. We can see commodities far and wide, but all the commodities are not traded. "Commodities are item for consumptions of the primary sector of the economy. The commodities which are made by diverse makers are still considered the identical. Thus, any physical substance like channa or copper which is indistinguishable with any other product of same type is a commodity. Commodities are used as an input in creation of other goods and services. Anything which has a demand and is supplied without product differentiation is called a commodity. Crude oil is a commodity and it has single price around the world, which is determined daily based on global supply and demand. Cement, in contrast which is discriminated by the way of branding and is not a commodity. Likewise, paintings are not commodities as every painting is distinct from the other. Commodities by description are homogeneous in character. Thus, one fraction of the commodity provides the same use as any other as in one kilogram of copper will be the same as any other kilogram of copper. It makes no distinction to which kilogram they obtain" (Chatnani, 2017).

A commodity is often referred as an article of commerce, which have an established market where it can be bought and sold by buyers and sellers through commercial transactions.

So commodities are understood to mean a good that has the following properties:

- It is produced and sold by different producers
- The quality of the commodity is homogeneous
- Price is determined according to the supply and demand.

Commodities can include a wide range of products as shown in the Table 2.1.

Table No: 2.1 Table Showing Commodities Traded In Commodity Exchanges Worldwide.

<i>Agricultural Products</i>	<i>Industrial Metals</i>	<i>Precious Metals</i>	<i>Energy</i>
Oil and Oil seeds	Copper	Gold	Crude Oil
Spices	Nickel	Silver	Natural Gas
Pulses	Zinc	Platinum	Furnace Oil
Cereals	Aluminium		Aviation Turbine Fuel (ATF)
Plantations	Palladium		Power
Fibers	Lead		
Potato	Tin		
Sugar	Steel		
Live Stock	Sponge Iron		

Source: Chatnani (2017).

The prices of the commodities are established in the market place where buyers and sellers come together to a consensus regarding the variations in the product that are acceptable which are then processed into final goods. The prices are determined by the buyers and sellers who are the core participants in the commodity market. A commodity market is a place where buyers and sellers of commodities will come together to settle at price at which commodities are traded. “The supply part is symbolized by the sellers and the demand part is symbolized by the buyers who meet at a common place to trade. The commodities are offered to the buyers by the sellers at a price, while the buyers’ bids for the commodity till a seller agrees to a price; after which the trade is established. The market functions as a vehicle for price discovery, prices which are determined by the supply and demand of the commodity. The participation in commodity market by buyers and sellers happen in most cases through intermediaries called brokers” (Chatnani, 2017).

The need for commodity market can be understood with the following example. A wheat farmer in Punjab can have a lot of prospective buyers for his harvest in the form of flour millers, cereal manufacturers like ITC. The industrial consumers like ITC will be interested in buying the wheat at lowest possible price while a farmer would want to get highest possible price for his crop. Unless there is a pre organized deal with ITC, he will have to compete with other farmers who are offering their products in the spot market. As the numbers of suppliers are many, ITC is likely to offer only low prices; buy in the year of decreasing yields the farmer is able to get higher price in spot market for his yield. The uncertainty of spot market gave rise to forward contracts where buyers and sellers agree upon a price for grain to be delivered at a future date. While prices are set no cash is exchanged till the commodity is actually delivered. By negotiating the price at the time of sowing the seeds (say, October) that accommodate a reasonable profit for the farmer and ITC, the farmer is freed from worrying over the price of wheat at the time of harvest (say, April). Cash flows can be projected at a reliable accuracy and as a result both the farmer and the counter party, ITC can make better plans accordingly. In forward contracts there is a risk that counterparty might not fulfill the obligation as they are not backed by any exchanges. “Each party to the forward contracts is on its own when it comes to finding counterparty at the time of delivery. It was primarily the reason for establishing commodity exchanges and from this commodity futures trading as we know

it gradually developed. The counterparty default risk is eliminated as these contracts are backed by exchanges” (Fortnallis, 2014).

With the establishment of commodity exchanges all the commodity contracts were standardized. The commodity contracts were transformed into tradable commercial vehicles which helped in attracting speculators. The contract sizes, delivery sizes and the delivery methods were standardized which helped in making commodity contracts interchangeable instruments. The interchangeability of futures contracts allows them to readily offset the contract before delivery at the time of maturity by simply selling their contracts during market hours. In the same manner the sellers of the contract can be relieved from the burden of delivery of commodities by simply buying back the contract which was sold at the exchange. “Just like closing a stock position, selling a contract which was previously bought or buying a contract which was previously sold leaves the trader flat (i.e. devoid of a contract)” (Fortnallis, 2014). The profit or loss is determined by the difference in contract price and sale price. Unlike forward contracts, one can enter into future contract even if the person don't need or own the commodity. In most cases less than 4% of the contract does the actual delivery of the contracts. The vast majority contracts gets closed a month before the actual delivery.

The introduction of margin in the futures contract was another novelty that attracted investors. In old days, forward contracts were executed through oral communication and a promise about the delivery in future. With the introduction of futures contract, the investors have to deposit a certain sum of money as margin at the time of entering into contract. It acted as a guarantee that the contract will be executed. The margin of future contract is very small so that speculators are asked to deposit as little as 5% of the total contract value .These initial margins changes according to commodities and market conditions. “If commodity prices decline below their purchase price, the buyer- the long position, sees the loss deducted from his or her margin balance while the seller –the short position is credited with a gain” (Fortnallis, 2014).

## **2.2 HISTORICAL EVOLUTION OF COMMODITY FUTURES MARKET**

### **2.1.1 GLOBAL SCENARIO**

The future trading is believed to have started in China with rice as a commodity more than 6000 years ago. The commodity future trading was started to make sure that there is continuous supply of agricultural commodities all over the year. As the trading progressed, producers of the commodities wanted different ways to safe guard the price of the commodity as factors such as weather, and variations in supply and demand created wide fluctuations in the price of commodities. With the increasing supplies of commodities, there arouse a need to store these commodities for future use. In Japan, the merchants used to store their commodities in warehouses for which warehouse receipts were issued. “Cash was raised by selling these receipts against the stored rice. These were known as “rice tickets”. These rice tickets were accepted as general currency later. Accordingly rules were formulized to standardize the trading in rice tickets.” (Baker and Filbeck)

It was in 1710, the first organized futures market named “Dojima Rice exchange” was started in Osaka, Japan. The concept of future trading was started in USA by the middle of 19<sup>th</sup> Century, where maize contracts were traded in Chicago Board of Trade. In the coming years cotton futures began to be traded in New York. With the advancement of railroads and telegraph lines in the following years, Chicago developed into a major commercial hub. With the emergence of centralized warehouses and advancement of communication technology and transportation facilities by 20<sup>th</sup> century, these market centers were able to distribute the commodities more economically and efficiently. The New York Coffee, Cotton and Produce Exchanges were started in 1870s and 1880s. Some of the largest commodity exchanges in USA are the Chicago Board of Trade (CBOT), the Chicago Mercantile Exchange (CME), New York Mercantile Exchange (NYMEX), the New York Commodity Exchange and the New York Coffee, Sugar, and Cocoa Exchange. The commodity future trading exchanges have been established in more than 20 countries including Canada, England, India, France, Singapore, Japan, Australia and New Zealand. Some of the leading commodity exchanges and the contracts traded in them are listed below:

Table No: 2.2 List of leading commodities exchanges and the contracts traded

<i>Sl.No:</i>	<i>Name of commodity exchange</i>	<i>Contracts traded</i>
1	Chicago Mercantile Exchange (CME)	Butter, Milk, Frozen Pork bellies, Di Ammonium Phosphate, Non-fat dry milk, Urea, Urea Ammonium Nitrate, Feeder cattle, , Lean Hogs, Live Cattle, etc.
2	New York Mercantile Exchange ( NYMEX)	Light Sweet Crude oil, Natural Gas, Heating Oil, Gasoline, RBOB Gasoline, Electricity, Propane, Gold, Silver, Copper, Aluminium, Platinum, Palladium etc
3	London International Financial Futures and Options Exchange	Cocoa, Robusta Coffee, Corn, Potato, Rapeseed, White sugar, Feed Wheat, Milling Wheat etc.
4	Chicago Board of Trade (CBOT)	Corn, Soybeans, Soybean oil, Soybean meal, Wheat, Oats, Ethanol, Rough Rice, Gold, Silver
5	London Metal Exchange (LME)	Aluminium, Copper, Nickel, Lead, Tin, Zinc, Aluminium Alloy, North American Special Aluminum Alloy ( NASAAC), Polypropylene, Linear Low Density Polyethylene, etc.
6	New York Board of Trade (NYBOT)	Cocoa, Coffee, Cotton, Ethanol, Sugar, Frozen concentrated orange juice, pulp etc
7	Tokyo Commodity Exchange (TOCOM)	Gasoline, Kerosene, Crude Oil, Gold, Silver, Platinum, Palladium, Aluminium, Rubber etc.
8	Sydney Futures Exchange (SFE)	Greasy Wool, Fine Wool, Broad Wool, Cattle
9	Dubai Gold and Commodity Exchange (DGCX)	Gold, Silver, Fuel Oil, Steel, Freight Rates, Cotton etc.
10	Bursa Malaysia Berhad	Refined Bleached Deodorized Palmolein, Crude Palm oil, Palm Kernel oil etc.

11	Winnipeg Commodity Exchange	Canola, Feed Wheat, Western Barley etc.
12	Dalian Commodity Exchange	Corn, Soybean, Soybean Meal, Soy oil etc.
13	Zhengzhou Commodity Exchange ( CZCE)	Wheat, Cotton, Sugar etc
14	Central Japan Commodity Exchange	Gasoline, Kerosene, Gas oil, Eggs, Ferrous scrap etc
15	Shanghai Futures Exchange (SHFE)	Copper, Aluminium, Natural Rubber, Plywood & Long Grained rice
16	Brazilian Mercantile and Futures Exchange	Anhydrous Fuel Alcohol, Arabica Coffee, Robusta-Conillion coffee, Corn, Cotton, Feeder Cattle, Live Cattle, Soybean, Crystal Sugar, Gold etc
17	Kansai Commodity Exchange	Soybean, Raw Sugar, Raw Silk, Shrimp(Frozen), Coffee, Corn, Azuki beans(red) etc.
18	Osaka Mercantile Exchange	Ribbed Smoked Sheets (RSS3), Technically Specified Rubber(TSR20), Nickel, Aluminum, Rubber Index
19	Singapore Commodity Exchange	Coffee, Rubber (RSS1,2,3)
20	Tokyo Grain Exchange (TGE)	Corn, Soybean Meal, Soybeans, Red Beans, Coffee, Sugar, Raw Silk, Vegetables etc
21	Intercontinental Exchange (ICE)	Brent Crude oil, Electricity, Emissions, Gas oil, Heating Oil, Gasoline (RBOB), Natural Gas, WTI and all the futures contracts of its subsidiary- The International Petroleum Exchange (IPE)

Source: <http://www.rediff.com/money/2008/jan/03cmd1.htm>

## **2.1.2 INDIAN SCENARIO**

### **2.1.2.1 ORIGIN**

The commodities trading in India dates back to several centuries. But, it was in 1875, the first organized commodity traded started with cotton as a commodity in by Bombay Cotton Trade Association Limited, which was only just a decade after it started in Chicago. “It was started as a joint stock company with full capital participation from European cotton traders. The Cotton Contract Committee was started in 1918, as a first step to regulate the trading in India, which was replaced by the Cotton Contract Board in 1919. Finally in 1922, a Central Cotton Association came into existence and it was later popularly known as the East India Cotton Association Ltd” (Kulkarni, 2011).

In the lines of cotton, oil seeds were also traded in India with the establishment of “Gujarati Vyapari Mandali” in 1900. It was situated in Mumbai which served as a platform in which futures trading was carried out in oilseeds like castor seed, groundnut, and cotton seed. Till the Second World War, the market for Oil seeds was thriving in India. It was one of the main businesses in the areas of Gujarat and Punjab, and till now continues to be the major oilseed production and trading states. Following the cotton and oilseeds, the third commodity which began trading in India was Jute. An organized future trading in jute was possible with establishment of Calcutta Hessian Exchange in 1919. With the establishment of Chamber of Commerce Hapur, the organized wheat trading was also started. Gradually the futures trading had extended to bullion commodities by 1920 in Mumbai. With the improvement of business, many other organized exchanges were established and the future trading gradually progressed in to other commodities like sugar, potato pepper etc.

The depression of global economies as a result of World War 2 during the period 1939-45 has also brought forth a severe blow for the Indian economy. The government had to undertake serious steps and to have control on the production, price and the use of foreign exchange. These regulations affected Indian Commodity markets to a great extend as a result the futures market was on the edge of near extinction. As a result,



during the year 1947, the Bombay Forward Contract Control Act was passed for reorganization of the cotton, jute and oilseed exchanges.

“The constitution of India that was assumed by the parliament on 26<sup>th</sup> January 1950 positioned the focus of “Stock Exchanges and Futures Market” in the union list. The focus of union list is a central government matter and hence the job for regulating the forward contracts rested with the Central Government of India. The Indian Parliament passed Forward Contracts (Regulation) Act, 1952 (also known as FCRA) which till now regulates forward contracts in commodities across India”(Kulkarni,2011).

### **2.1.2.2 POST INDEPENDENCE BAN**

The period after independence was really hard for the economy as India was aiming for self-reliance. With the suspicion that futures’ market can create turmoil in spot market, it was always looked upon in doubt. Eventually, in 1952, it was decided by the government to ban commodity futures by means of the powers given under the FC(R) Act. The early years of the 1960s were faced with severe economic pressures and deteriorating of commodity trade system as a result of droughts and wars which eventually gave rise to many occurrences of non-payments in forward trades across the country. Due to economic pressure and a fear of extreme speculation the government decided to ban the commodity trading in several commodities which were classified as “essential”. This decision created a lot of dispute between the government and commodity traders who claimed that the ban in commodity trading was imposed without clear empirical evidence and as a result of the ban there is a chance of hoarding among spot traders and large producers which may affect the consumer prices more serious than the impact of future trading.

Several studies done on the Indian futures market shows that if there is a well organized futures market it can reduce consumer price fluctuations. One such study conducted by Mr.V.Jayashankar, Chairman, Spice Board of India, states that it is the commodities which are not under futures trading that showed more price fluctuations than the commodities which have future trading.

### **2.1.2.3 REVIVAL OF COMMODITY MARKET**

The debate of allowing futures trading of commodities was receiving considerable attention during the liberalization. The government also made a lot of investigation in this issue for a long period of time. But it was in the early 2000s that the government made the decision to re introduce commodity trading in several national level commodity exchanges. “During the duration of 50 years, four committees were chosen by the government to investigate various problems to deal with the forwards/futures markets in the country. These were the:

- Shroff Committee appointed in 1950
- Dantwalla Committee appointed in 1966
- Khusro Committee appointed in 1979 and
- K.N.Kabra Committee appointed in 1993

The most important one is the K.N.Kabra committee. Most of the recommendations of this committee were accepted by the government, which led to the most important step of allowing futures trading in selected commodities in the year 2003” (Kulkarni, 2011). Following the liberalization, the Indian government withdrew the controls on procurement and distribution which further demanded to have a sound market system in order to facilitate the functions of price discovery and price risk management.

The National Agriculture policy was announced in 2000 which followed a liberalized approach towards agriculture and trade. In the union budget of 2002-03, it was announced by the Finance Minister about the willingness to restart the commodities trading in an organized and transparent way. Subsequently the government issued the notification of permitting futures trading in commodities on 1<sup>st</sup> April 2003. The options trading on commodities and trading in the indices of the commodities was not allowed as per this notification. Thus ended a four decade long period ban on commodities trading and marked the beginning of trading in commodity exchanges after being inactive for a long period of time.

## 2.2 GROWTH OF COMMODITIES MARKET

After the removal of restrictions in the commodities trading in 2003, India has achieved a remarkable progress in terms of commodities turnover and volume. With the approval of several national level exchanges, Indian commodities market has become highly competitive in terms of product development and strategies. “At present there is a two layer structure for commodity exchanges in India: National and Regional. In accordance with the amendments made in Securities Contracts Regulation Act (SCRA), 1956 under the powers given by the Finance Act, 2015, commodity derivatives are included within the definition of securities” (SEBI,2015). Accordingly, the exchanges mentioned below are recognized as stock exchanges with effect from September 28, 2015.

Table No: 2.3 National Commodity Exchanges

Sl. no	<i>Commodity Derivative Exchanges</i>
1	Multi Commodity Exchange of India Ltd., Mumbai (MCX)
2	National Commodity & Derivatives Exchange Ltd., Mumbai (NCDEX)
3	ACE Derivatives and Commodity Exchange, Mumbai. (ACE)
4	National Multi Commodity Exchange of India Ltd., Ahmedabad (NMCE)
5	Indian Commodity Exchange Ltd., Mumbai (ICEX)
6	Universal Commodity Exchange Ltd, Navi Mumbai (UCX)

Source: Annual Reports, SEBI, FMC

Table No: 2.4 Regional Commodity Exchanges

Sl.No	<i>Regional Commodity Derivative Exchanges</i>
1	The Chamber of Commerce, Hapur
2	Rajkot Commodity Exchange Ltd., Rajkot
3	India Pepper & Spice Trade Association, Kochi
4	Spices & Oilseeds Exchange Ltd, Sangli

Source: Annual Reports, SEBI,FMC

Following are the list of Commodities which are permitted to be traded in various commodity exchanges under Section 15 of the F.C. (R) Act 1952.

Table No: 2.5 Table Showing List Of Commodities Permitted To Trade In Indian Commodity Exchanges

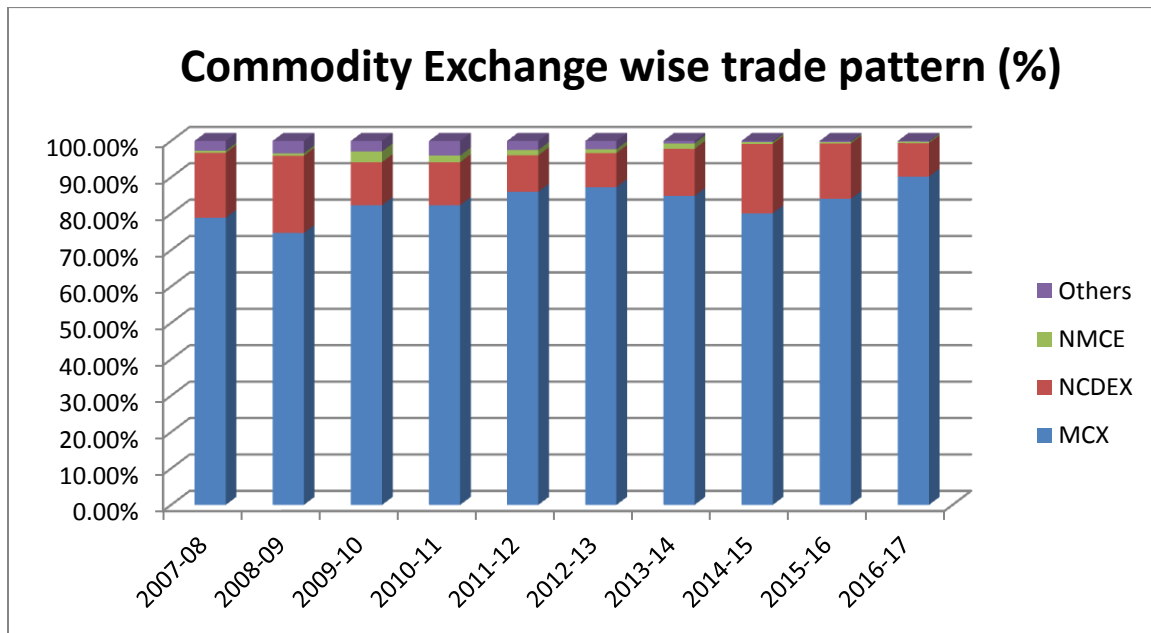
Sl.No.	Commodity	Sl.No	Commodity
<b>I</b>	<b>Food Grains and Pulses</b>	41	Rapeseed oilcake/Mustard oilcake
1	Arhar Chuni	42	Rapeseed/Mustard seed
2	Bajra	43	RBD Palmolein
3	Barley	44	Rice Bran
4	Gram	45	Rice Bran oil
5	Gram Dal	46	Rice Bran oilcake
6	Guar	47	Sunflower oil
7	Jowar	48	Sunflower oilcake
8	Kulthi	49	Sesame
9	Lakh (Kesari)	50	Sesame oil
10	Maize	51	Sesame oilcake
11	Masur	52	Soymeal
12	Moth	53	Soy oil
13	Mung	54	Soybean
14	Mung Chuni	55	Sunflower oil
15	Mung Dal	58	Aniseed
16	Peas	59	Betal Nuts
17	Ragi	60	Cardamom
18	Rice or Paddy	61	Chillies
19	Small Millets	62	Cinnamon
20	Tur Dal	63	Cloves
21	Tur	64	Coriander Seed
22	Urad ( Mash)	65	Ginger
23	Urad Dal	66	Methi
24	Wheat	67	Nutmeg
<b>II</b>	<b>Oil Seeds and Oils</b>	68	Pepper
25	Celery Seed	69	Turmeric

Table 2.5 (Continued)			
26	Coconut Oil	<b>IV</b>	<b>Metals</b>
27	Coconut Oil Cake	70	Copper
28	Coconut	71	Zinc
29	Cotton Seed Oil	72	Lead
30	Cotton Seed Oil Cake	73	Tin
31	CPO Refined	74	Gold
32	Crude Palm Oil	75	Silver
33	Crude Palm Olive	76	Silver Coins
34	Ground Nut	<b>V</b>	<b>Fibers and Manufactures</b>
35	Groundnut oil	77	Art Silk Yarn
36	Groundnut oil cake	76	Cotton Cloth
37	Linseed	77	Cotton Pods
38	Linseed oil	78	Cotton Yam
39	Linseed oil cake	79	Indian Cotton
40	Rapeseed oil/Mustard oil	80	Jute goods
56	Sunflower oil cake	81	Kapas
57	Sunflower seed	82	Raw Jute
<b>III</b>	<b>Spices</b>	83	Staple Fiber Yam
84	Camphor	93	Rubber
85	Castor Seed	94	Seedlac
86	Chara or Berseem	95	Shellac
87	Crude oil	96	Sugar
88	Gram Husk	97	Furnace oil
89	Gur	98	Ethanol
90	Khandsari Sugar	99	Cooking Coal
91	Polymer	100	Electricity
92	Potato	101	Natural Gas

Source: Annual Reports of SEBI/FMC

The commodity exchange wise trade pattern shows that Multi Commodity Exchanges have the highest market share among all the commodity exchanges in India followed by NCDEX and NMCE.

Chart No: 2.1 Chart Showing Commodity Exchange Wise Trade Pattern



Source: Commodity Insights Yearbook. 2017.

### 2.3 MULTI COMMODITY EXCHANGE

This study which analyses the price discovery and volatility spillover in commodity market primarily focuses on the leading commodity exchange in India, Multi Commodity Exchange (MCX). Multi Commodity exchange is the largest commodity exchange in India in terms of the market share. It started its operations in November 2003 and operates under the frame work of Securities Exchange Board of India (SEBI). It is a public listed company with a market capitalization of ₹52.6 billion. The exchange is also offering online trading and clearing and settlement of commodity futures transaction. It is the first commodity exchange in India to launch options contracts. It is also the first listed exchange and also offers evening trading to match international market hours. It is the seventh largest commodity futures exchange in the world by the number of futures contracts traded during the year 2016-17.

The average daily turnover of the Multi Commodity Exchange amounted to ₹20,372 crores during the year 2016-17. The MCX have a wide national presence with 669 registered members and 51,575 Authorized persons with presence in more than 1200 cities across India. It offers commodity derivative contracts in various segments like Bullion, Base Metals, Energy and agricultural commodities. MCX is the leading commodity exchange in India with a market share of 90.1 in terms of value of commodity derivatives traded during the year 2016-17. MCX has been honored with the recognition of “India’s Leading Commodity Exchange and Introducing new products in Commodities derivatives market” by ASSOCHAM during the year 2017. It has also been awarded “Best Commodity Exchange of India 2017” by PHD Chamber of Commerce and Industry.

The strategic alliances with various International exchanges like have strengthened the operations of MCX. The exchange have also enabled tie ups with trade bodies, educational institutions, R&D Centers and corporate across the country. MCX has partnered with Thomson Reuters to develop India’s first Co-branded commodity index series- iCOMDEX. iCOMDEX series consists of iCOMDEX composite, iCOMDEX Base Metals, iCOMDEX Bullion, iCOMDEX Gold, iCOMDEX Copper, iCOMDEX Crude Oil. The following table shows segment wise contracts, quantity and value traded in MCX.

Table No: 2.6 Segment Wise Contract, Quantity And Value Traded In MCX during 2007-17

	<b>Bullion</b>			<b>Base Metals</b>		
<b>Year</b>	<b>Traded Contract(Lots)</b>	<b>Quantity (000's)</b>	<b>Total Value (Lacs)</b>	<b>Traded Contract(Lots)</b>	<b>Quantity (000's)</b>	<b>Total Value (Lacs)</b>
2007	25808354	8208138.57	132210618.45	22527998	39767105.32	85482086.64
2008	49891138	15438188.20	268086441.82	21299838	39445432.93	65823697.70
2009	58946792	14083681.50	310951039.30	47430828	72122692.72	129176087.33
2010	69347700	14216616.36	442622395.10	71612333	122833611.86	238881499.97
2011	197513181	16396220.90	950966765.17	79385716	115411912.10	262375231.35
2012	180950448	13355218.92	805834577.28	113902235	140395983.37	310029726.55
2013	113148590	11066366.59	543932802.18	81452388	114997443.00	226118077.28
2014	48773849	4713907.21	225279112.34	44686317	60042102.33	122968301.56
2015	43621037	4676277.13	203981403.28	61721565	82715848.25	147789650.63
2016	41706752	4881614.09	229906109.71	64140891	94365348.90	164916332.42
2017	27731112	2735758.12	137347284.90	65506594	91851671.25	196605208.60
	<b>Energy</b>			<b>Agri Commodities</b>		
<b>Year</b>	<b>Traded Contract(Lots)</b>	<b>Quantity (000's)</b>	<b>Total Value (Lacs)</b>	<b>Traded Contract(Lots)</b>	<b>Quantity (000's)</b>	<b>Total Value (Lacs)</b>
2007	15671922	2260277.80	44700981.96	4937643	41159235.39	10588403.27
2008	21265114	2840317.95	89010964.47	1819250	13212357.28	5416681.49
2009	52324264	18463342.73	148880330.93	2464405	19816162.23	6644950.56
2010	52717713	18131156.95	178676823.30	3529055	23170420.58	9506241.20
2011	64638345	17828455.85	265351646.01	4655125	30711139.10	14591559.47
2012	85807445	40650497.40	344448330.03	8090946	32371964.37	28746998.88
2013	63444751	33747595.10	284276827.17	6581964	20019203.86	18992733.04
2014	36361020	21609190.95	164495341.73	3930662	12083973.57	13407180.54
2015	107586332	22118422.93	191740448.98	3418027	10037313.64	11652928.96
2016	136013722	25193821.74	202709364.69	3216150	11909904.94	13622238.65
2017	102914689	20679844.27	166921461.04	2437131	8705198.52	11730932.92

Source: MCX Website



## **2.4 BRIEF PROFILE OF SELECTED COMMODITIES TRADED IN MCX**

A brief profile of selected commodities under the study is presented below:

### **2.4.1 GOLD**

Gold is world's first global currency and an important constituent in global fiscal reserve. Global gold demand can be classified into four major categories: Jewellery, Investment, Central Bank Reserves and Technology. The Annual demand for gold jewellery fell to a 7 year low of 2041.6 tonnes in 2016-17 while the gold investment observed a rise of 70% reaching its high since 2012. Demand for Gold ETFs also showed a considerable increase since 2009. The total demand for gold showed an increase by 3 % to 4308.8 tonnes. The total supply of Gold witnessed an increase by 5% to 4570.8 tonnes in 2016-17. Gold bullion imports in India were found to be 648.3 tonnes during the year 2016. The average daily turnover of gold in MCX during the year 2016-17 was found to be ₹ 31,528 Million with average daily open interest of 8.81 tonnes.

### **2.4.2 SILVER**

Silver is a radiant grey white metal which can be classified as both industrial and precious metal. Silver is mainly traded in London Metal Exchange and at COMEX. Silver's main spot market is LME and COMEX is where future and options of silver are traded. The demand of the silver is based on three main factors: Industrial, Jewellery & silverware and Photography which contributes to around 80% of annual silver consumption. The total demand for Physical silver decreased by 10% to 1027.8 Metric ounces during the year 2016-17. The total supply of silver was found to be 1007.1 metric ounces during the year 2016-17. The average daily turnover of silver in MCX during 2016-17 was found to be ₹27,214 million with an open interest of 644.15 tonnes.

### **2.4.3 CRUDE OIL**

Crude oil is the intricate mix of hydrocarbons which is found in the upper layers of earth's crust. It is also called "mother of all commodities" because of its importance in manufacturing wide variety of materials. Crude oil is refined and used to produce gasoline, diesel and many other petrochemical products. Crude oil is used for the fuel of

cars, airplanes, boats and trains. It is also used in manufacturing many other products such as asphalt for roads, plastics for toys, bottles and as a lubricant in machines. The crude oil production in India was found to be 23.990 MMT. The share of off shore crude oil production is about 51%. The average daily turnover in MCX during the year 2016-17 was found to be ₹55,179 million with a average Open Interest of 2232'000 Barrels.

#### **2.4.4 NATURAL GAS**

It is one of the important components in the world's energy supply. It is considered to be one of the cleanest and safest of all the energy resources. With growing resource base and relatively low carbon emissions, natural gas is likely to play an important role in world energy segment. When the natural gas is compressed at a pressure of 250 bars, it becomes Compressed Natural Gas (CNG). The reserves of natural gas in India stood at 1488.49 billion cubic meters. The average daily turnover of Natural gas in MCX during the year 2016-17 stood at ₹11,206 million with an open interest of 9,109'000 MMBTU.

#### **2.4.5 COPPER**

Copper is a non precious metal which is an important contributor for national economies of mature and newly developed and developing countries. Copper is one the most recycled metal and its recyclability makes it a most preferred metal. The global copper production was found to be 16.73 million metric tonnes and the consumption stood around 19.69 MMT in the year 2016. The size of Indian Copper Industry is around 5 MMT (Ministry of Mines). The copper production in India stood at 3.64 MMT in the month of March 2017. The average daily turnover of copper in MCX during the year 2016-17 was found to be ₹ 16.670 million with an open Interest of 20,333 tonnes.

#### **2.4.6 ALUMINIUM**

Aluminum is the third most copious element present in the earth's crust. It is mostly used in transportation, packing, defense and consumer electronic industries. In 2016, world Aluminum production stood around 44.51 million metric tonnes while the world consumption stood at 43.75 MMT. India is one of the significant producers of aluminum, with annual production of 1.745 MMT for the year 2016-17. Odhisha and Andhra

Pradesh account for 90% of the Aluminium reserves in India. The average daily turnover of Aluminium in MCX during the year 2016-17 was found to be ₹ 6,404 million with Open Interest of 25,295 tonnes.

#### **2.4.7 ZINC**

Zinc is the fourth widely used metal after Iron, copper and aluminum. Around 50% of Zinc produced are used for galvanizing other metals like steel or Iron to prevent oxidization. The world refined zinc production was around 10.74 MMT and the consumption stood around 10.38 MMT. According to Ministry of Mines the zinc production in India stood at 789,405 metric tonnes. In India Rajasthan is the main producer of Zinc. The average daily turnover of Zinc in MCX during the year 2016-17 was found to be ₹28,835 million with Open Interest of 47,257 tonnes.

#### **2.4.8 LEAD**

Lead is a corrosion resistant, ductile and malleable blue grey metal which is primarily used in batteries, especially ones used in automobiles, motor cycles and electric cars. Recycled lead is found to account for 60% of total lead production. In the year 2016, the world lead production stood at around 8.35 MMT and the consumption stood around 8.40 MMT. During the year 2016-17, the Indian Lead mine production stood at 139,009 MT. The refined Lead production in India stood at 508,000 MT and the consumption stood at 567,000 in 2016. The average daily turnover of Lead in MCX during the year 2016-17 was found to be ₹14,651 million with open interest of 19,473 tonnes.

#### **2.4.9 NICKEL**

Nickel is naturally occurring silvery white metal. Almost 65% of nickel produced is used in making stainless steel. Another 20% is used in making steel and other non ferrous alloys. About 9% is used in plating and 6% for making coins, batteries etc. in 2016, the world refined nickel production was about 1.36 MMT and the world nickel consumption stood at 1.46 MMT. According to the World Bank data, Indian refined nickel consumption stood at 57,000 MT. The average nickel turnover in MCX during the year 2016-17 stood at ₹7,991 million with an open interest of 9,957 tonnes.

#### **2.4.10 CARDAMOM**

Cardamom is known as “Queen of Spices”. Cardamom is produced in the tropical regions of the world. Guatemala is the largest producer of cardamom followed by India. The world production of cardamom during the year 2016-17 stood at 55,000 MT. In the year 2016 the Indian cardamom production stood around 18,000 MT. Kerala is the largest producer of cardamom in India, followed by Karnataka and Tamil Nadu. Almost 90% of the cardamom production is consumed domestically. The leftover cardamom is exported every year. Saudi Arabia is the largest market of Indian cardamom followed by Kuwait, UAE and USA. The average daily turnover of cardamom in MCX during the year 2016-17 stood at ₹28 million with a open interest of 73 tonnes.

#### **2.4.11 MENTHA OIL**

Mentha is an aromatic herb which is also called Japanese Pudhina in India. In India, there are two types of menthol: crystals and flakes. Menthol crystals are mainly used in tooth paste, mouth fresheners, Unani medicines, pain balms, confectionaries etc. The global production of menthe oil stands at around 48,000 MT and the Indian production stood at around 38,000 MT in 2016. India is the largest producer and exporter of Mentha oil followed by China, Brazil and the US. The average daily turnover of menthe oil in MCX during the year 2016-17 stood at ₹1007 million with an open Interest of 1,446 tonnes.

#### **2.4.12 CRUDE PALM OIL**

Palm oil is obtained from fruit bunches of oil palm. There are different varieties of palm oil such as Crude Palm oil, Refined Palm oil etc. Refined derivatives of crude palm oil are used as edible oil. After an increase in price of crude oil, an increased use of CPO has been found as bio diesel. As it is environment friendly, CPO has been widely used as lubricants. Indonesia and Malaysia are the major producers and exporters of CPO. India is the largest importer of CPO. According to USDA 2017 estimates, consumption of edible oil in India stood at around 23.1 MT. In 2016-17, India imported around 57.49 MT of CPO. The average daily turnover of Crude Palm oil in MCX during the year 2016-17 stood at ₹1670 million with an open Interest of 82,454 tonnes.

### **2.4.13 COTTON**

Cotton is generally used for the fiber which is used worldwide in textile manufacturing. The cotton production and cultivation are widely spread across the world however the production, consumption and trade are dominated by few nations. The world cotton production in 2016-17 was found to be 22.31 MMT. The top two consumers of cotton are China and India. India is the second largest exporter of cotton and the total production of cotton in India is expected to be 31.2 million bales in the year 2016. The average daily turnover of cotton in MCX during the year 2016-17 was found to be ₹1326 million with an open interest of 1,94,296 bales.

## **2.5 THEORETICAL FRAMEWORK**

The commodity market in today's world can be classified into spot and futures market. A spot market is a market where physical delivery of commodities happens in exchange of cash immediately or in a day. Futures contract is an agreement to buy or sell an underlying asset at a future date at a price which is determined today. A commodity future contract is a contract in which an underlying asset is a commodity. At the expiration of futures contract, the contract is settled either by cash or physical delivery which is also decided at the time of entering the contract. The commodity market is used by the hedger for price discovery and price risk management. An understanding of movement of futures and spot prices is essential to increase the returns and reduce the risk of transaction.

### **2.5.1 PRICE DISCOVERY**

Schreiber and Schwartz (1986) defines price discovery as a process through which the markets try to reach equilibrium. Garabde and Silber (1983) states that in the static sense price discovery indicates the existence of equilibrium prices and in the dynamic sense, price discovery is the process that describes how information is conveyed across the markets. Sahadevan (2002) identifies the price discovery in commodity market as the process of determining the price of a commodity based upon the supply and demand factors. The expectations theory hypothesis states that the current future price is a consensus forecast of the spot price in future. Ivanov (2011) identifies price discovery

as the relative contribution in terms of pricing guidance that one market have over other. The performance of price discovery can be measured from the temporal relation between futures and spot prices. The causal relation investigates whether spot market leads the future market or the future market leads the spot market or whether there is bidirectional relation between two markets. If information is first reflected in future price and later in spot price, future price should lead the spot price indicating that the future market performs the price discovery function.

There are numerous theoretical frameworks existing in literature which explains the connection between spot and futures market. One of the accepted and simple one is based on “Basis Behavior”. Basis is the disparity amid future price and spot price. When futures price is found to be higher than spot price, it is called Negative Basis or “Contango”. Positive Basis also known as backwardation is a situation where spot prices are higher than futures prices. In Backwardation, spot prices are more volatile.

Another popular model for explaining the relationship between future and spot prices is cost of carry model. It is also called “Theory of Storage” was formulated by Kaldor (1939) and Working (1948, 1949). The model states that the futures price should be equal to current spot prices and the carrying costs. The cost of storage includes interest rates, warehouse rent, insurance and convenience yield. The model is based the argument that futures prices should be high enough to make up for the storage costs. If futures prices are found to be low, arbitrageur will sell in spot market and take position in future market to avoid incurring carrying costs. The convergence is achieved at the maturity of contract where the spot and future prices are at equilibrium. Thus cost of carry model is used to analyse long run equilibrium relationship of future and spot prices of same commodity for the same period.

Because of the non stationary characteristic of the variables, cointegration theory has been found advantageous in analyzing the long run equilibrium relationship between futures and spot prices. Cointegration theory implies that two non stationary time series demonstrating same stochastic trend tend to go together in long run even though deviations from the equilibrium relationship can occur in short run. (Engle and Granger, 1987). Cointegration is used for testing the cost of carry model. Cointegration

theory and the associated error correction term helps to understand the linear combination of the interrelated variables and the relationship and co movement of these non stationary variables in long run and short run. The empirical testing of cost of carry model involves two folds: 1. Test of efficiency in price discovery and 2. Tests of lead lag relationship between future and spot prices. The analysis of price discovery and lead lag relationship are closely related and are related to each other through Granger Representation Theorem. According to Granger Representation Theorem (Engle Granger 1987), when the futures prices are priced efficiently, both futures and spot market will be co integrated. If the markets are co integrated, they are represented through an error correction model, where the speed of convergence of market in case of disequilibrium in short run is identified. The presence of error correction term signifies the price discovery process in which the degree of disequilibrium corrected as well as the relative magnitude of adjustment whereby both market come to equilibrium is measured. If two markets are co integrated, then they are associated with some form of lead lag relationship. Accordingly, the market which incorporates the information first, does the price discovery function.

The analysis of price discovery function in the commodity market has come up with mixed results. The studies of Garabde and Silber (1983), Zapata et.al;(2005), Fu and Qing (2006), Kumar and Arora (2010),Sehgal et.al; (2013), Sendhil and Ramasundaram (2014), Shakeel and Purankar (2014), Kumar and Shollapur (2015), Jin et.al; (2016) revealed a leading role of futures market in price discovery. The studies of Sahadevan (2002), Easwaran and Ramasundaram (2008), Nath and Lingareddy (2008), Srinivasan and Ibrahim (2012), Besavraj (2013), Athma and Rao (2013), Joshi and Ganesh (2015) revealed a leading role of spot market in price discovery. A mixed role of both future and spot market in price discovery was found in the studies of Dash and Andrews (2008), Mahalik et.al;(2009), Shihabudheen and Padhi (2010), Figuerola and Gonzalo (2012), Sehghal et.al; (2013), Sharma et.al;(2015), Raghavendra et.al;(2016).

## **2.5.2 VOLATILITY SPILLOVER**

The measurement of volatility is an important issue in the commodity market. Volatility refers to the degree of fluctuations or variability around mean; where

mean may be constant or time varying. In an arbitrage free economy, price volatility is directly related to the flow of information. The notion of volatility spillover of asset returns has been derived from the studies of Engle et.al; (1990) who proposed major theoretical foundations for own and cross spillovers. As pointed out by (Amarnath, 2015), the “Heat Wave Hypothesis” suggests that current volatility of a market is a function of past volatility of the same market which is also called volatility clustering. The cross spillover where current volatility of one market is a function of past volatility of same market as well as the past volatility of other market which is also called volatility spillover or “Meteor Shower Hypothesis”. It has been observed that market which is integrated exhibit meteor shower phenomena or cross market volatility spillover as they are affected by same socio political, legal and trade scenarios.

A significant characteristic in the study of volatility is the property of asymmetry (Nelson and Foster, 1994). Bad news creates more volatility than good news. This is called asymmetric effect. The study of volatility is found to be important to analyse the market efficiency and market integration. Higher level of own spillover indicates low level of efficiency (Bollerslev and Hodrick, 1992). Secondly, Higher level of cross market spillover indicates higher level of inter market dependence.(Engle and Susmel, 1993, Baekart and Harvey, 1995).

The research on volatility spillovers has made use of GARCH family models which is considered best to capture the volatility effect of time series. Unlike univariate GARCH model, bivariate model make use of information from two markets and inspect the volatility spillover effect between two co integrated markets. Bollerslev(1986)’s generalized autoregressive conditional heteroscedasticity (GARCH) is not used to study the volatility spillover as it assumes leverage effect is counterbalanced. Nelson’s (1991) Exponential generalized autoregressive conditional heteroscedasticity (EGARCH) is employed to capture asymmetric shocks and to circumvent non negativity constraints of coefficients. The studies of Morales(2008), Mahalik et.al; (2009), Shihabudheen and Padhi (2010), Srinivasan and Ibrahim (2012), Mahalakshmi et.al; (2012), Chauhan et.al; (2013), Suri (2015), Trabelsi (2017) revealed a significant volatility spillover between the markets.