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The Development of Energy Derivative on MCX and Challenges for Further Development

*Rashmi Sharma**

ABSTRACT

Energy commodities exchanges usually trade futures contracts on energy products, such as trading contracts to receive a particular commodity in physical form. Indian has three national (MCX - NMCE - NCDEX) and 12 state commodity exchanges. Among those, MCX is the biggest and most popular platform. Energy segment on MCX contribute a lot to the market volume and play a crucial role in Indian commodity market.

Over 11 year active, energy derivative had launched lots of future instruments but most of them are inefficient and were cancelled after short time existed. In contrast, some instruments such as crude oil future and natural gas future contracts witness huge development in both trading volume and value; becoming the core of India energy derivative segment. At present, MCX energy market contributes a major part to total MCX commodity trading platform. The present paper intends to study the development of Indian energy market on MCX exchange and to find out the challenges for its further extension in near future.

Keywords: *Derivatives; MCX; Option; Future; Forward; Swap.*

1.0 Introduction

Energy commodity can be defined as a product or material such as crude oil, coal, electricity, gasoline and natural gas, which investors can trade in the commodity market. Energy commodities exchanges usually trade futures contracts on energy products, such as trading contracts to receive a particular commodity in physical form.

Speculators and investors also buy and sell the futures contracts at commodity exchanges to make a profit and provide liquidity to the system. In a free market economy, Futures trading performs two important economic functions, price discovery and price risk management. Such trading in commodities is useful to all sectors of the economy, not only the energy market.

**Assistant Professor, School of Management, JECRC University, Jaipur, India, (Email Id: rashmi.sharma@jecrcu.edu.in)*

The forward prices give advance signals of an imbalance between demand and supply. This helps the government and the private sector to make plans and arrangements in a shortage situation for timely imports, instead of having to rush in for such imports in a crisis-like situation when the prices are already high. This ensures availability of adequate supplies and averts spurt in prices.

Indian has three national (MCX - NMCE - NCDEX) and 12 state commodity exchanges. Among those, MCX is the biggest and most popular platform. Energy segment on MCX contribute a lot to the market volume and play a crucial role in Indian commodity market.

2.0 Derivatives Market

2.1Meaning of derivative instrument

The term "derivatives", refers to a broad class of financial instruments which derive their value from the price and other related variables of the underlying asset. They do not have worth of their own and derive their value from the claim they give to their owners to own some other financial assets or security.

3.0 Multi Commodity Exchange of India Limited (MCX)

The MCX India is the first listed exchange, it is facilitates online trading, and clearing and settlement of commodity futures transactions, thereby providing a platform for risk management. The Exchange, which started operations in November 2003, operates within the regulatory framework of the FCRA, 1952 and regulations there under. MCX offers trading in more than 55 commodity futures contracts across segments including bullion, ferrous and non-ferrous metals, energy, and agricultural commodities.

MCX is India's leading commodity futures exchange. To ease participation, the Exchange offers facilities such as calendar-spread facility, as also Exchange of Futures for Physical (EFP) transactions which enables participants to swap their positions in the futures or physical markets. The exchange's leading index, the MCXCOMDEX, is a real-time composite commodity futures price index which gives information on market movements in key commodities. Other commodity indices developed by the exchange include MCX Agriculture, MCX Energy, and MCX Metal. With an aim to seamlessly integrate with the global commodities ecosystem, MCX has forged strategic alliances with leading international exchanges such as CME Group, London Metal Exchange (LME), Shanghai Futures Exchange (SHFE) and Taiwan Futures Exchange (TAIFEX).

The Exchange has also tied-up with various trade bodies, corporate, educational institutions and Research and Development centre across the country.

4.0 Literature Review

There have been many researches on the development and efficiency of Indian derivative market. Some significant findings are indicated below.

4.1 Indian commodity derivative market

Besides studies for the whole Indian derivative market, some researchers keep their attention on the commodity market (Table 1.0). The examinations of market efficiency and connection between future and spot market have been done.

Table 1.0: Review of Literature on Indian Commodity Market

S.No.	Researcher	Research Topic/ Objective	Sample frame/ Field of Study	Findings/ Conclusion
1	Singhal, Shelly (2017)	Emergence of Commodity Derivatives as Defensive Instrument in Portfolio Risk Hedging: A Case of Indian Commodity Markets	Daily and monthly returns of three alternative asset classes for a data span of 8 years from Jan 2006 to Dec 2013	When commodities are considered in a portfolio context for combination of equity and commodity optimal portfolios have been obtained. For COMDEX and MCX Metal optimal combination ratio was 65% of SENSEX and 35% of commodity. For MCX AGRI the ratio is 7:3 and for MCX Energy the ratio is 3:1 for SENSEX and commodity respectively.
2	Kumar Mahalik, M., Acharya, D. & M. Suresh, B. (2017)	Price discovery and volatility spillovers in Indian spot-futures commodity markets	futures and spot indices of Multi-Commodity Exchange (MCX); including MCXCOMDEX, MCXAGRI,	The volatility spillovers from future to the spot market are dominant in the case of LENERGY and LCOMDEX index while LAGRISP acts as a source of volatility toward the agri-

			MCXENERGYand MCXMETAL from June 2005 to December 2008	futures market
3	Nilanjan Ghosh (2018)	The issues and concerns of commodity derivative in India	three major themes discussed are strengthening and expanding the scope of commodity derivative trading; impact of futures trading on commodity prices; role of commodity derivative markets in the global meltdown	There was still debate of whether to expand the market scope, due to regulation and facility issues; but the advantage of derivative market is far beyond the disadvantage; the derivative market should be expanded and strengthened by more regulation
4	Snehal Bandivadekar and Saurabh Ghosh	Derivatives and Volatility on Indian Stock Markets	Daily data for BSE Sensex and S&P CNX Nifty have been used for the period January 1997 to March 2003	there was a change in the market environment since the year 2000, which is reflected in the reduction in volatility in all the BSE indices and S&P CNX Nifty
5	Shree Bhagwat et.al (2012)	An analysis of Indian financial derivatives market and its position in global financial derivatives market.	The trading volume and turnover of main instruments on NSE & BSE had been gathered from 2001 to 2012.	The exchange-traded derivative of NSE & BSE remained in top fastest developing market, according to World Federation of Exchange which ranks 14 compare selected stock exchanges globally.

6	Pavabutr, P. &Chaihetpho n, P. (2008)	Price discovery in the Indian gold futures market	The nascent gold futures contracts in the Multi Commodity Exchange of India (MCX) over the period November 2003 to December 2007	Trades initiated in mini contracts are much more informative than what the size of their market share of volume suggests.
7	Ramasundar am, R. & Easwaran, S. (2008)	Whether commodity futures market in agriculture is efficient in price discovery	The effect of futures trading activity (trading volume; proxy of futures liquidity) on spot price volatility for seven agricultural commodities (guar seeds, turmeric, soya bean, black pepper, barley, maize and Castor Seed) from April 2004 to March 2012.	Unexpected futures trading volume can impact spot price volatility and the results are significant for five out of seven agricultural commodities (Guarseed, Turmeric, Soybean, Maize and Castor Seed).
8	Ranganathan , T. & Ananthakum ar, U. (2014)	Market efficiency in Indian soybean futures markets	Soybean spot and futures prices are collected from February 2004 extending up to September 2011	Higher volatility in spot markets would mean a much higher futures price than the expected spot price in the future
9	Sehgal, S., Ahmad, W. &Deisting, F. (2015)	An investigation of price discovery and volatility spillovers in India's foreign exchange market	Daily futures prices of 4 currencies i.e. USD, euro, British Pound and Japanese Yen are retrieved from MCX-SX and NSE from February 01, 2010 to February 29, 2012.	The movement of volatility spillover takes place from futures to spot in the short-run while spot to futures found in the long-run.

10	Tripathy, N. (2010)	Expiration and week effect: Empirical evidence from the Indian derivative market	The time series data was collected from November 2007 to November 2009, which contained 25 expiration dates from Niffty 50	There are no price distortions on the expiration day or during the expiration week.

4.2 Energy derivative research

Table 1.1: Literature Review of Energy Derivative Research

S.No.	Researcher	Research Topic/ Objective	Sample frame/ Field of Study	Findings/ Conclusion
1	Energy Information Administration, U.S. Department of Energy (2002)	The role of derivatives in managing some of the risks in the production and consumption of petroleum, natural gas, and electricity		The effectiveness of derivatives is dependent upon the trading volume of the underlying commodity market. Commodity markets with large numbers of informed buyers and sellers will support the derivative market.
2	CME Group (2009)	The excessive speculation issue and need of position limit on energy derivative market		The existence of position limit in energy would reduce the speculation activity and its effects to the market; improving the market stability.

3	Jeff Fleming and Barbara Ostdiek	The impact of energy derivative on the crude oil spot market.	West Texas Intermediate (WTI) crude oil market, the commodity underlying the NYMEX crude oil futures contract from 1982 to 1997	The introduction of crude oil futures significantly increased the volatility of spot market & no effects following the introduction of crude oil options and no pattern in the effects across the time series of introductions of other energy derivatives.
4	Deng and Oren (2006)	The importance of electricity derivative in risk management		the standardization will reduce transaction costs and produce liquidity, which in turn will improve the efficiency of risk management practices

A lot of researches had been done to examine the efficiency and price discovery function of Indian derivative market.

5.0 Development of Energy Derivative on MCX

5.1 Energy derivative instruments on MCX

Multi Commodity Exchange of India Limited (MCX) first introduced the derivative instrument for the energy market in 2005 with the start of 3 future contracts for crude oil, brent crude oil, and furnace oil.

Table 2 below provides a more insight look on MCX products during different periods. Total 11 type of contract had been launched on MCX, but most of them did not last for long. Gasoline, heating oil, coal and Middle East sour crude oil was cancelled only 3 years after their introduction in 2009. Other contracts such as Carbon credit and Furnace oil existed for 4 years before being cancelled. The most disappointing contract is Electricity future, which was only 1 year old. The Brent crude oil future is now on the edge of being eliminated as there has been no more trading volume for this contract since 2016. On the other hand, there are 3 energy future contracts widely traded on MCX at the moment; including crude oil, natural gas, and crude oil mini. They share some

commons in the Contract specification, which represent the standardization and regulation of the authority. On the other hand, some characteristics are specified for each contract. Table 3 demonstrates the overview of contract specification for energy future contract on MXC.

Table 2: List of Instruments Traded on MCX Energy Market

Year started	Underlying assets	Year ended	Note
2005	Crude Oil	Remain Now	Majority traded
2005	Brent Crude Oil	Remain Now	No trading volume in 2016 & 2017
2005	Furnace Oil	2009	
2006	Natural Gas	Remain Now	Majority traded
2006	Middle East Sour Crude Oil	2009	
2008	Carbon Credit	2012	
2009	Electricity	2010	
2009	Gasoline	2012	
2009	Heating Oil	2012	
2009	Coal	2012	
2015	Crude oil mini	Remain Now	

Source: *https://www.mcxindia.com/market-data/trade-statistics*

Table 3: Specification of Current Future Contracts on MCX Energy Market

Symbol	Crude Oil	Crude Oil Mini	Natural Gas
Number of contract a year	12	12	12
Contract duration	6 months	6 months	3 months
Trading period	Monday to Friday: 10:00 am to 11:00 am		
Trading unit	100 barrels	10 barrels	1250 mmBtu
Quotation	Rs/barrel	Rs/barrel	Rs/mmBtu
Maximum order size	10,000 barrels	10,000 barrels	20,000 mmBtu
Tike size	1 Rs	1 Rs	0.1 Rs
Initial margin	Minimum 4%	Minimum 4%	Minimum 4%
Extreme loss margin	1%	1%	1%
Maximum allowed open position	4,00,000 barrels or 5% of market open position	60,00,000 mmBtu or 5% of market open position	
Delivery unit	50,000 barrels with +/-2% tolerance limit	10,000 mmBtu	
Delivery center	Port installation in Mumbai	Hazira Hub	

Source:*https://www.mcxindia.com/market-data/trade-statistics*

6.0 Empirical Study of Energy Segment on MCX

6.1 The growth of energy segment on MCX

Energy future segment play a crucial role in MCX exchange. Despite of the entering and exit of many instruments; energy segment still manage to maintain high growth rate in number of traded contracts and trading value. The traded contracts rise from 5.2 million in the first year, 2005, to 136 million contracts in 2016; increasing 26 times after 11 years. Moreover, the trading value witness high growth from 13.88 million lakhs in 2005 to 202.7 million lakhs in 2016; which means the trading value had increased 15 times during that period. The average daily traded value also increased 17 times from 45.2 thousand lakhs to 782.6 thousand lakhs for the same period. Both trading volume and trading value witnessed a significant decline in 2013 and 2014 with the sequent decrease of 58% and 52% in 2 years; due to the exit of 4 future contracts at the end of 2012; including Gasoline, heating oil, coal and carbon credit. However, the main reason was the sudden decrease of crude oil future contract and natural gas future contract during that period. The disappearance of 4 future contracts must have a certain impact on investor faith to the market. Otherwise, the international crude oil price remained stable around $100/barrel and witness less fluctuation than the period of 2007 – 2011 (Appendix); leading to the going down of demand for hedging risk by future contract. In 2015, the number of traded contracts had sharply increased 195.5% comparing to the 2014, and reached the peak of 136 million contracts in 2016; highest peak in MCX energy segment history. This sudden move of the market can be explained by the introduction of new product: Crude oil future mini contract; as well as the significant decrease in international oil price from around $100/barrel to near $25/barrel during that period.

Table 4: MCX Energy Segment Trading Volume and Trading Value in Lakhs

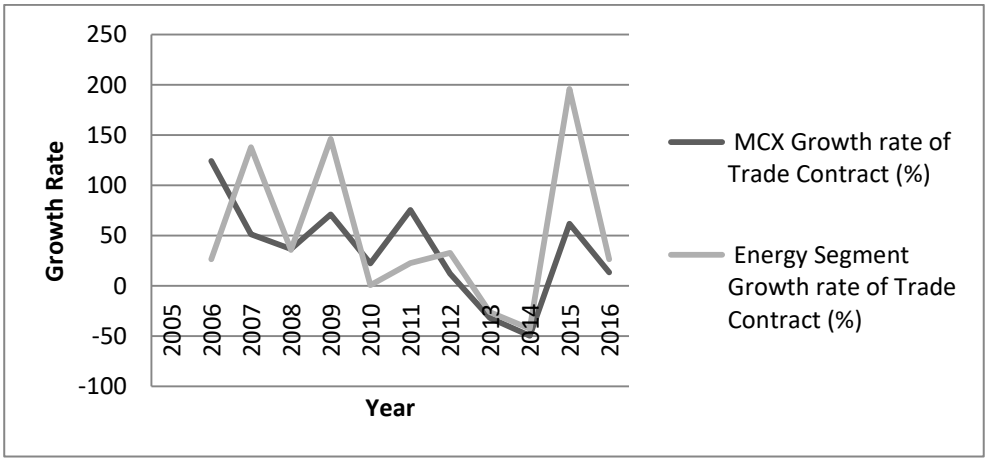
Year	Traded contracts	Value (Lakhs)	Average daily value (Lakhs)
2005	5,201,722.00	13,887,637.47	45,236.60
2006	6,584,572.00	16,709,074.33	54,426.95
2007	15,671,922.00	44,700,981.95	146,560.60
2008	21,265,114.00	89,010,964.48	289,938.00
2009	52,324,264.00	148,880,330.93	488,132.23
2010	52,717,713.00	178,676,823.31	582,009.20
2011	64,638,345.00	265,351,646.00	858,743.19
2012	85,807,445.00	344,448,330.04	1,121,981.53
2013	63,444,751.00	284,276,827.17	922,976.71

2014	36,361,020.00	164,495,341.73	613,788.59
2015	107,586,332.00	191,740,448.98	743,180.03
2016	136,013,722.00	202,709,364.69	782,661.64

Source:*https://www.mcxindia.com/market-data/trade-statistics*

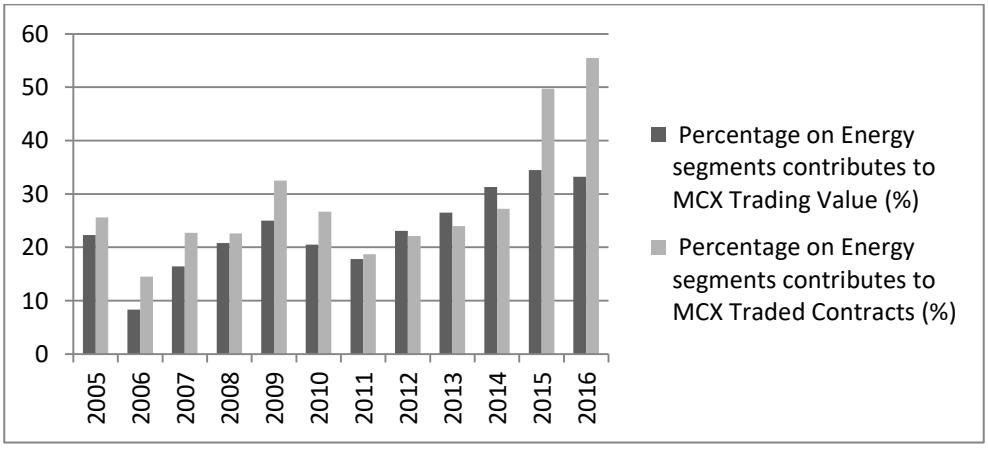
In addition, the growth rate of energy segment comparing to total MCX market has consolidated the strength of energy future market comparing to other commodity future market. In the period from 2005 to 2009, energy future contract on MCX had been success to maintain the average growth rate of 86.6% per year; helping the total year wise traded contracts and trading volume multiplied 10 times in 5 years. The most outstanding year for this segment to grow was in 2015 when the year wise trading volume raised 195.9% comparing to the previous year, which witnessed the negative growth rate. Moreover, since the energy derivative segment was formed; this segment performed higher growth rate in year wise trading volume than the total MCX commodity market in most year given; even when these two markets overcame the negative growth from 2012 to 2014. For 11 years of developing from 2005 to 2016, MCX exchange average growth rate is 35.2%; while energy segment on MCX successfully kept up with the average growth rate of 50.7%. Overall, the growth rate of energy segment is higher than the growth rate of total commodity market on MCX. This fact partly explains the increase in contribution in size of energy segment to total commodity future market on MCX platform.

Figure 1: Growth Rate of Trading Volume of Energy Segment Comparing to MCX



The attraction of energy segment on MCX to investors has been increasing after time; especially in the recent year. For the first 4 years after the launch of this segment, energy future had contributed 20% on average to the trading volume of total MCX exchange. With the launch of 4 new contracts in 2009, energy segment had taken 30% of MCX total traded contracts in year wise. Despite of the step backward in the next two years due to the inefficient of the new instruments; energy segment trading volume and value grew steadily in the following year. The breakthrough in its growth was made in 2015 with the introduction of a total new contract: Crude oil mini, which requires less capital for making a transaction; therefore, attract more individual investors. This breakthrough had widely opened the market to individual investors and speculation investors, who were previously limited in the market by the large capital requirement issue. By the end of 2016, the traded contracts of this segment contributed 55% of total MCX trading volume; and contributed 33.2% of total MCX trading value. The success of crude oil mini contract and energy segment is forecasted to continue in the next recent years. There are four main segments in MCX platform: Agriculture, Metal, Bullion, and Energy; however, the energy segment has taken over 33% and 55% of total MCX trading value and traded contracts in sequence. Its dynamic for further growth and its attraction to investors are undeniable at the current time.

Figure 2: The Contribution of Derivative Energy Segment to MCX Trading Volume and Trading Value in Percentage

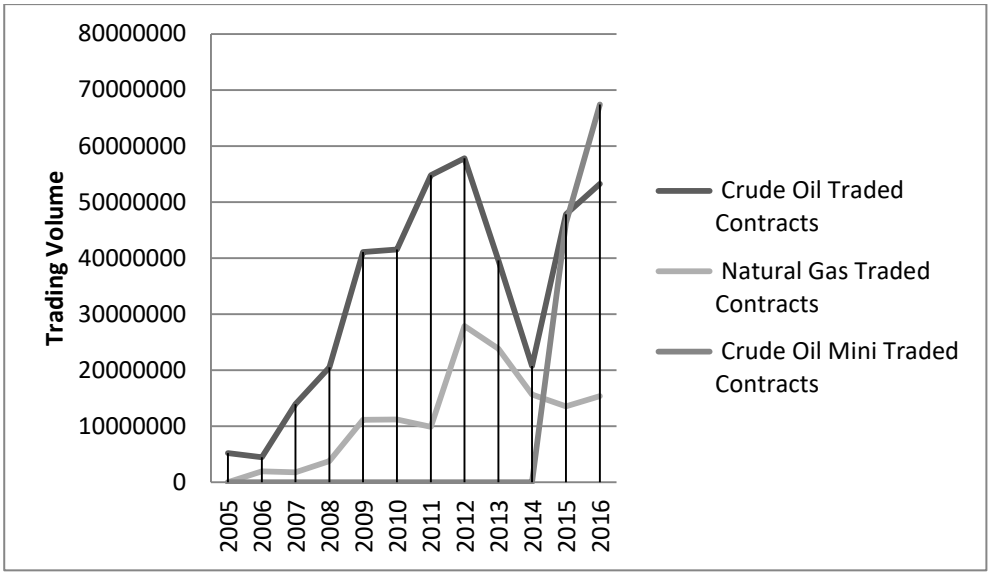


In conclusion, the energy segment on MCX exchange has achieved significant results after 11 years of development.

6.2 The growth of favourable contracts in energy segment

The trading volume of crude oil and natural gas future contract increased 10 times in 5 years after they were launched. They reached the peak of 57.7 million contracts for crude oil and 27.8 million contracts for nature gas in 2012; before overcame the significant decline during 2013 – 2014. One year later, the trading volume of crude oil contract sharply increased for 130%, despite the stagnant of nature gas contract. The main participants in these contracts are energy companies with the price hedging purpose; therefore, the fluctuations in their trading volume are closely connected with the international oil price. The period from 2012 to 2014 was the stable time for energy price, when the crude oil price was around $100/barrel. In contrast, the period 2005-2011 and 2015-2016 witnessed the high fluctuation in oil price, when the price volatility range was from $25 to $125/barrel. The higher volatility in international oil price, the higher risk faced by energy corporations; leading to higher demand for entering future contracts.

Figure 3: The Trading Volume of Current Energy Contracts on MCX Energy Segment



However, the constant growth rate of crude oil and nature gas future contract were not stable.

Table 5: The Growth Rate in Volume of Current Energy Contracts on MCX Energy Segment

	Crude oil Trading Volume Growth Rate (%)	Natural Gas Trading Volume Growth Rate (%)	Crude Oil Mini Trading Volume Growth Rate (%)
2006	-13.40		
2007	212.07	-11.31	
2008	47.12	116.27	
2009	100.38	196.85	
2010	1.08	0.47	
2011	31.82	-11.58	
2012	5.55	182.19	
2013	-31.55	-14.55	
2014	-47.59	-34.41	
2015	130.51	-13.61	
2016	11.44	13.73	45.59
Average	**40.68 %**	**42.40 %**	**45.59 %**

Source:*https://www.mcxindia.com/market-data/trade-statistics*

In addition, the launch of crude oil mini future contract in 2015 created a new chapter for MCX energy segment. It has been more successful than expectation and was considered to be the most outstanding product of MCX energy segment until now. The first year wise trading volume of crude oil mini was 46.3 million contracts; much higher than the starting year of crude oil (5.1 million contracts) and nature gas (1.9 million contracts). In the second year, this instrument claimed the top position in MCX energy segment with 67.4 million contracts; the second place was traditional crude oil with 53.3 million contracts; and the last rank belonged to nature gas with 15.3 million contracts. The feature of small capital requirement comparing to traditional crude oil contract is the advantage of this new product, which attract more individual investor seeking for speculation opportunity.

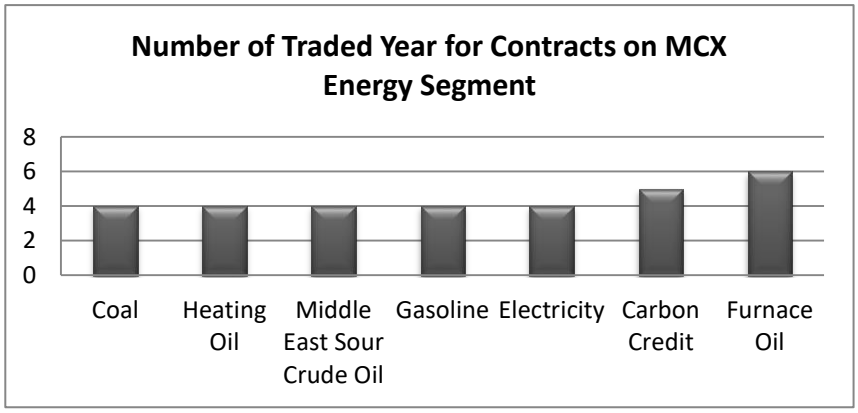
Overall, the crude oil future contract and nature gas future contract has been the fundament of MCX energy derivative market since they were launched, and they are continuing to maintain their position in near future.

6.3 The inefficiency of some energy derivative instruments on MCX

Despite the success of some derivative contracts such as crude oil and natural gas future; the rest of energy segment on MCX has an unfortunate result. There have been 8 types of contract being cancelled by MCX regulator between 2009 and 2012; five of them had been cancelled after only 4 years of existing. These contracts include Coal,

Heating, Middle East Sour Crude Oil, Gasoline; Electricity; furthermore, Carbon credit future and Furnace oil lasted for 5 years and 6 years in sequence before being wiped out of market. Furnace oil contract and Middle East Sour crude oil contract were the first contract to be eliminated in 2009 after a long operation without efficiency. However, the most disappointed period was from 2009 to 2012, when ECX launched 4 new types of contracts with the intention to replace those two which had just been cancelled. But three contracts including coal, heating oil and gasoline were closed within 4 years; while electricity future brought the most disappointment when being closed after 2 years in the market.

Figure 4: The Length of Existence for Cancelled Contracts on MCX Energy Segment



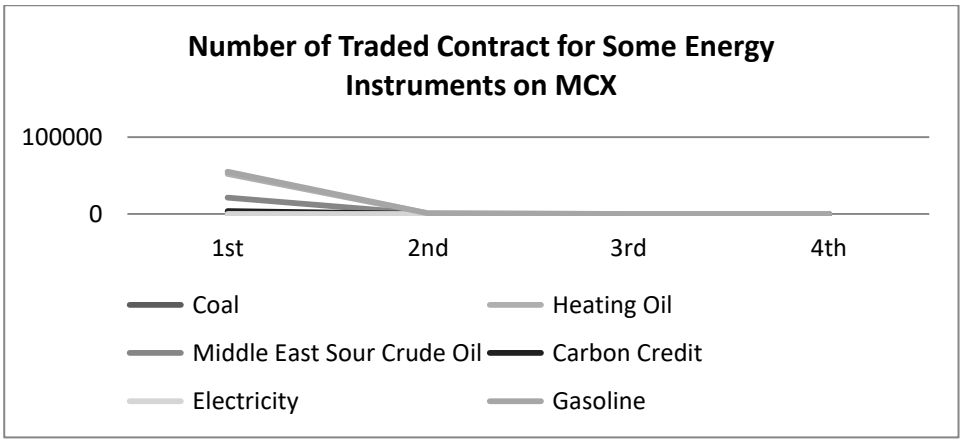
Source: *https://www.mcxindia.com/market-data/trade-statistics*

The disappearance of those instruments after short time traded on MCX can be easily explained by the inefficient of those contracts on the market and lack of trading volume.

7.0 Challenges for Further Development

Even though the energy derivatives market on MCX has made good progress in the last few years, the volume and the value of business has zoomed up; but the commodities allowed for trading are not diversified; focus only on crude oil and nature gas.

Figure 5: The Trading Volume of Cancelled Contracts on MCX Energy Market



7.1 Energy options

After 11 years of development, MCX has never introduced any option contract for all commodity segments. Energy segment is a crucial part of commodity market; which contributes 55% and 33.2% in consequence of total MCX trading volume and value. The market for commodity derivatives cannot be called complete without the presence of option contract. Both futures and options are necessary for the healthy growth of the market. Therefore, the existence of options in energy segment will complete the energy derivative market; providing wider methods for investors to hedge risk; increase the trading volume of this segment. The development of an energy option instrument should be considered by MCX authority.

7.2 Warehousing and standardization

For commodity derivatives market to work efficiently, it is necessary to have a sophisticated, cost-effective, reliable and convenient warehousing system in the country. Warehouses also need to be conveniently located.

However, the delivery system of crude oil and nature gas on MCX has lots of limitations. First, the delivery center is set up in Mumbai for all contracts traded over the country. Mumbai is the only warehouse for crude oil and nature gas traded on MCX; every deliveries made around India must start from Mumbai. Therefore, it is more costly and more time consuming if the goods are delivered to remote area of India. Second, all the tax or duties involving with goods, as well as the transaction cost must be covered by buyers. Since the only warehouse in Mumbai, it becomes a burden for buyer if they enter

the energy future contracts; the transaction cost is pushed up for the purchasers. Finally, the delivery process starts at the day of expiry date. By 6.00 pm, seller must submit copies of relevant documents as a proof of holding stock at the time of giving his intention to purchase the goods. By 7.00 pm, all delivery information must be confirmed by both sellers and buyers. In such a short time in evening, the pressure is creased for each party. The chance of making errors and cost of working overtime make it less convenient for contract participants.

The improvement of warehouse system and paperwork process will boost up the attraction of energy market to market participants. More warehouses should be set up along India to minimize the transaction cost and time consummation for goods delivery. The time for submitting documents and paperwork can be set earlier and extended during the expiry day.

7.3 Cash versus physical settlement

It is probably due to the inefficiencies in the present warehousing system that only about 1 percent to 5 percent of the total commodity derivatives trade in the country is settled in physical delivery. At present under the Forward Contracts (Regulation) Act 1952, cash settlement of outstanding contracts at maturity is not allowed. In other words, all outstanding contracts at maturity should be settled in physical delivery. To avoid this, participants square off their positions before maturity. Energy derivative market also has the same problem. The 1952s Act has limited the interest and capacity of small investors to the energy segment on MCX; as well as the whole commodity market. There is a need to modify the law to bring it closer to the widespread practice and save the participants from unnecessary hassles.

7.4 Base assets

There have been 10 basic assets used for creating future contract on MCX energy market; including crude oil, brent crude oil, furnace oil, natural gas, Middle East sour crude oil, carbon credit, electricity, gasoline, heating oil, and coal. However, only 2 of them last until today, which are crude oil and nature gas, the most widely traded energy products around the world. Unfortunately, others base assets had not been that successful and already shown their unattractive characteristic to investors because those assets are not widely traded at spot market; the trading volumes of those assets at spot market are also much lower than crude oil and nature gas. Moreover, the price level of carbon credit, electricity, gasoline, heating oil, and coal are partly more stable than crude oil, which used to surfer a shock in price after each few years. Even when the price shocks happen, they are hardly as serious as crude oil price shock. The need to hedge the

future price risk is unnecessary. Because of all above reasons, the trading volumes of most contracts were near to zero by the second year existed on market.

7.5 Lack of economy of scale

There are too many commodity exchanges: three national level exchanges include MCX - NMCE – NCDEX and twenty one regional exchanges. Though over various energy commodities, counting from the past till present, are allowed for derivatives trading; in practice derivatives are popular for only a few commodities such as crude oil and natural gas. Again, most of the trade takes place only on a few exchanges. All these split volumes not only make some exchanges inactive; but also withdraw the volumes from big exchanges.

This problem can possibly be addressed by consolidating some exchanges. Also, convergence of securities and commodities derivatives markets is necessary to bring in economies of scale and scope without having to duplicate the efforts, thereby giving a boost to the growth of commodity derivatives market.

8.0 Conclusion

After 11 years of developing, MCX energy market has made some big progress; becoming one of three major sector of MCX exchange, which contributes 55% and 33.2% in consequence of total MCX trading volume and value. It manages to gain the trust of investors and growth in both size and number of effective products.

Among all contracts, crude oil and natural gas remained the core of energy future market. The trading volume of crude oil and natural gas future contract increased 10 times in 5 years after they were launched. On the other hand, most of other contracts could not survive more than 4 years, and their trading volume were nearly zero by the second year on the market.

For further development in near future, MCX must face some major challenges. First is the requirement of option contracts. Both futures and options are necessary for the healthy growth of the market. Therefore, the existence of options in energy segment will complete the energy derivative market; providing wider methods for investors to hedge risk; increase the trading volume of this segment. Second, there is only one warehouse in Mumbai for energy products, which lower the attraction for investors to enter energy future contract, as there is no convenience. Third, the cash settlement is not allowed; every contract must have physical delivery. Fourth, MCX exchange has difficulty finding the suitable based asset for market interest. Finally, the money flow is not concentrated in one market because there are 3 national and 21 state exchanges for

commodity. Although MCX remains the biggest exchange, the diversification in cash flow contributes to the slowdown of its development. If MCX energy segment can overcome those 5 challenges, the market will be more efficient and wider in both size and number of contract.

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Appendix

Table 5: Trading Information of MCX Exchange

Year	Trade contract	Trade contract Growth (%)	Value (Lakhs)	Average daily value (Lakhs)
2005	20,314,046.00		62,309,762.90	202,963.40
2006	45,540,142.00	124.2	202,443,577.44	659,425.33
2007	68,945,917.00	51.4	272,982,090.36	895,023.25
2008	94,275,340.00	36.7	428,337,785.48	1,395,237.09
2009	161,166,289.00	71.0	595,652,408.13	1,952,958.72
2010	197,206,801.00	22.4	869,686,959.59	2,832,856.55
2011	346,192,367.00	75.5	1,493,285,202.04	4,832,638.19
2012	388,751,074.00	12.3	1,489,059,632.74	4,850,357.11
2013	264,627,693.00	-31.9	1,073,320,439.71	3,484,806.62
2014	133,751,818.00	-49.5	526,149,906.36	1,963,245.92
2015	216,346,961.00	61.8	555,164,431.89	2,151,800.12
2016	245,077,515.00	13.3	611,154,045.47	2,359,668.13

Source:*https://www.mcxindia.com/market-data/trade-statistics*

Table 6: Trading Information of Energy Segment on MCX Exchange

Year	Trade contract	Trade contract Growth (%)	Value (Lakhs)	Average daily value (Lakhs)
2005	5,201,722.00		13,887,637.47	45,236.60
2006	6,584,572.00	26.6	16,709,074.33	54,426.95
2007	15,671,922.00	138.0	44,700,981.95	146,560.60
2008	21,265,114.00	35.7	89,010,964.48	289,938.00
2009	52,324,264.00	146.1	148,880,330.93	488,132.23
2010	52,717,713.00	0.8	178,676,823.31	582,009.20
2011	64,638,345.00	22.6	265,351,646.00	858,743.19
2012	85,807,445.00	32.8	344,448,330.04	1,121,981.53
2013	63,444,751.00	-26.1	284,276,827.17	922,976.71
2014	36,361,020.00	-42.7	164,495,341.73	613,788.59
2015	107,586,332.00	195.9	191,740,448.98	743,180.03
2016	136,013,722.00	26.4	202,709,364.69	782,661.64

Source:*https://www.mcxindia.com/market-data/trade-statistics*